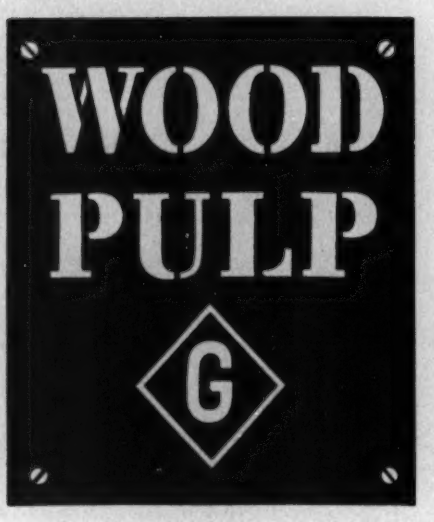
Paper



Established 1886

"No wisdom won with weariness."
HENRY C. BUNNER

Facilities of the Pulp and Paper Industry have increased prodigiously. Sources of supply have multiplied. But with paper consumption by the average American family up from 250 pounds to 1,400 pounds a year since only 1930, sufficient production is inevitably a problem.

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TITANOX pigments can help you get the most out of your present supplies in meeting current demands for many types of paper. TITANOX research has developed titanium dioxide pigments specially suited to paper making and has established definite recommendations for their use. These TITANOX pigments will enable you to accomplish the following economically and with no loss in fiber strength: Increase brightness and opacity... Increase opacity while maintaining constant brightness... Overcome the transparentizing effects of resins and waxes... Limit show-through of light-weight papers... Reduce the weight of paper while maintaining opacity... Overcome the darkness of low-colored pulps... Brighten tinted papers and minimize after-yellowing.

TITANOX-A-WD—the water dispersible pure titanium dioxide pigment—is recommended for addition to the beater, but is successfully used in coating. The rutile-calcium pigment TITANOX-RCHT is also recommended for coating. Each pigment is characterized by fine and optimum particle size which affords maximum whiteness, brightness and opacity... ensures easy mixing and complete dispersion.

Our Technical Service Department is always available to help you get the most out of your present pulp supply through the use of TITANOX pigments. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 1; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Ltd., Montreal 2; Toronto 1.

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TITANIUM PIGMENT CORPORATION
Subsidiary of NATIONAL LEAD COMPANY

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy Sterling-Jones Paper Co., South Hamilton, Ohio

Drive headache cured with B. F. Goodrich grommet belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

HERE was one of the biggest drive problems in this paper mill. The washer shown in the picture runs 24 hours a day, 7 days a week. Belts previously used couldn't handle the job. Motor bearings were burning out, belts were snapping under the shock load.

Then a B. F. Goodrich distributor suggested grommet belts to stand the jerks and hard pulls. Installed eight months ago, B. F. Goodrich grommet belts are still going strong, and look good for many more months of use. Here's why BFG grommet belts give longer service, save maintenance costs:

Endless — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich makes the grommet! — No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B.F.Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

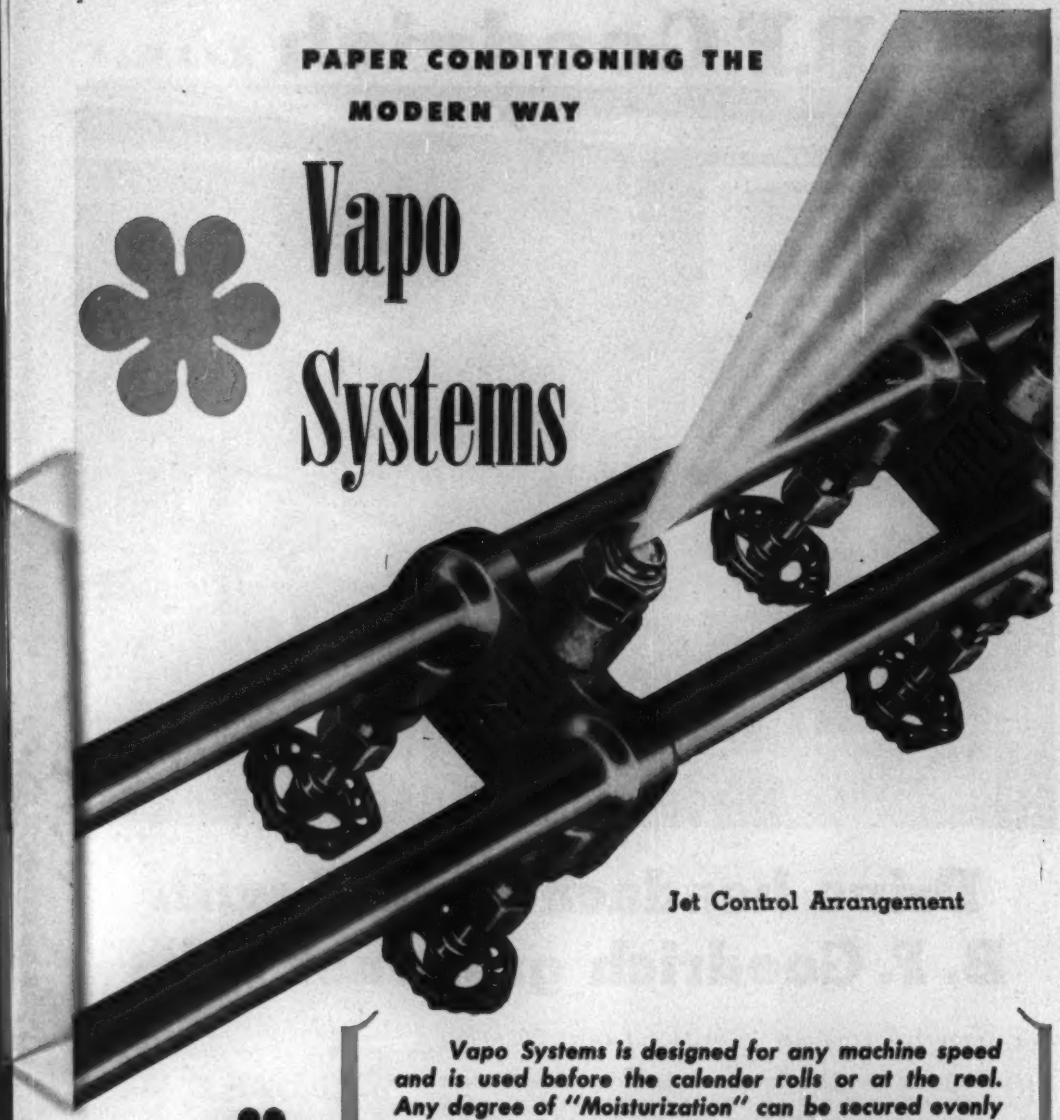
Grommet Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

PAPER CONDITIONING THE
MODERN WAY

Vapo Systems



Jet Control Arrangement

Vapo Systems is designed for any machine speed and is used before the calender rolls or at the reel. Any degree of "Moisturization" can be secured evenly and uniformly over the entire sheet. Control is thru accurate pressure regulating valves. Final operation is by pushbutton. Let us help you with your moisture problem.

VAPO SYSTEMS COMPANY

EUGENE M. FLINT
1931 So. Tenth Ave.
Maywood, Illinois

Member
American Society of Mechanical Engineers
American Association of Engineers
Licensed, State of Illinois No. 5513

Affiliate Member - American Pulp & Paper Mill Supt's. Assn.

Paper TRADE JOURNAL

VOL. 133 **SEPTEMBER 7, 1951** **No. 10**

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NEXT WEEK

Digesters Corroding? They can be successfully lined. With metal shortage they must be preserved. Johnson and Gibson give some helpful hints.

Are your vibrating screens working at top effectiveness? B. D. Warren can give you some help next week.

REMEMBER THESE DATES

SEPT. 14-15: American Pulp & Paper Mill Superintendents Assn., Northeastern Division, meeting at Poland Spring House, Poland Spring, Maine.

SEPT. 14-15: American Pulp & Paper Mill Superintendents Assn., Northwestern Division meeting at Northern Holiday Resort, Marenesco, Mich.

SEPT. 16-19: American Institute of Chemical Engineers, Regional Meeting, Sheraton Hotel, Rochester, N. Y.

SEPT. 20: American Pulp & Paper Mill Superintendents Assn., Michigan Division, Fall Meeting at Hotel Harris, Kalamazoo, Mich.

SEPT. 26-28: Alkaline Pulping Conference of the Technical Assn. of the Pulp and Paper Industry at the John Marshall Hotel, Richmond, Va.

SEPT. 28-29: American Pulp and Paper Mill Superintendents Assn., Pennsylvania-New Jersey-Delaware Division, Pocono Manor, Mt. Pocono, Pa.

OCT. 10-12: American Pulp & Paper Mill Superintendents Assn., Southern and Southeastern Div'ns, George Washington Hotel, Jacksonville, Fla.

OCT. 15-18: 6th Engineering Conference, Technical Assn. of Pulp and Paper Industry, General Oglethorpe Hotel, Wilmington Island, Savannah, Ga.

OCT. 29-31: National Foreign Trade Convention, Waldorf Astoria, New York City.

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TRAIL BLAZERS to more efficient paper production

Four important developments in paper-making efficiency—some of which are becoming standard practice with bearing manufacturers, *originated with* SKF

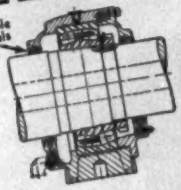
THE FIRST

Spherical Roller Bearings applied to paper machinery, with results of smoother paths for power and real operating economies, were SKF Bearings.

THE FIRST

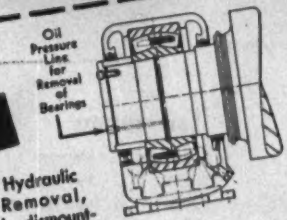
Rocker Mount Design, which permits expansion and contraction of the bearings and driers —with no lateral stresses on the side frames, was an SKF development.

THE FIRST



Triple Seals, for efficient non-rubbing sealing that retains lubricant independent of speed and temperature, were designed by SKF.

THE FIRST



System for Hydraulic Bearing Removal, where such dismounting of large or small bearings becomes a rapid and easy operation that eliminates damage to bearing and housings, was originated by SKF Engineers.

SKF

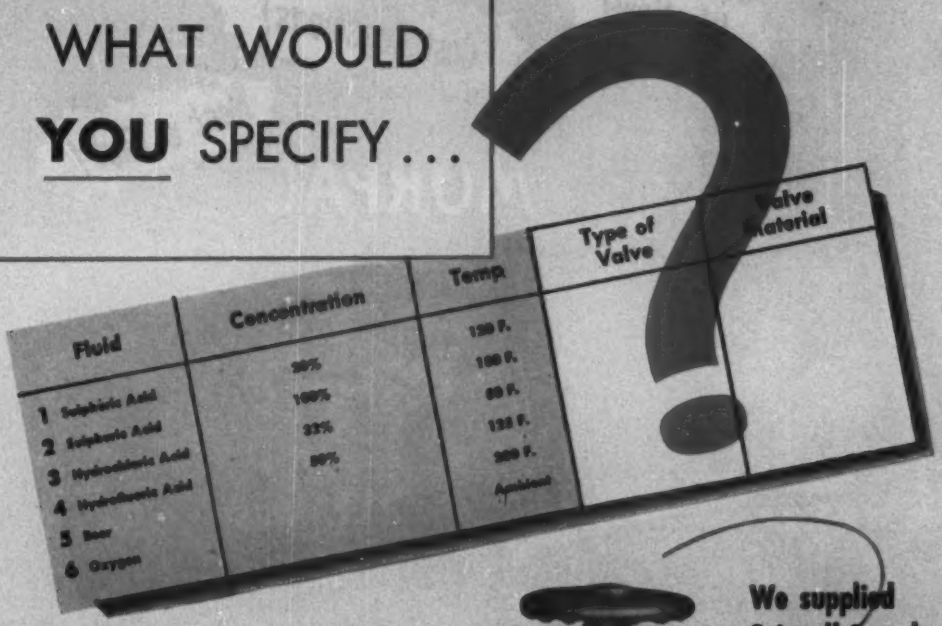
BALL AND ROLLER BEARINGS

Yes, SKF, in the paper industry as well as many others, has blazed the trail to more efficient, economical, reliable production. And right now, SKF Engineers in cooperation with machinery builders are *anticipating* the needs of advanced designs of paper machinery — so that years from now production will be even more efficient. **SKF** INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep Groove Ball Bearing—Spherical Roller Bearing—Self-Aligning Ball Bearing.* 7100

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

Integrity — Craftsmanship — Metallurgy — Tolerance Control — Surface Finish — Product Uniformity — Engineering Service — Field Service

WHAT WOULD **YOU** SPECIFY . . .



In several of these cases other body materials or diaphragms would serve as well. But the really important fact is the unmatched versatility of Grinnell-Saunders Diaphragm Valves in handling corrosive fluids, gases, compressed air, food and suspended solids . . . in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are problems.

Grinnell-Saunders Valve bodies are stocked in cast iron, malleable iron, stainless steel, bronze, and aluminum, with other materials available on special order. Valve bodies can be lined with lead, glass, natural rubber or neoprene. Diaphragms are available of natural rubber and a number of synthetics to suit particular service conditions.

The Grinnell-Saunders Valve Division will be pleased to submit recommendations upon receipt of complete information covering service conditions.

We supplied Grinnell-Saunders Diaphragm Valves with . . .

Body Material	Diaphragm Material
1 Rubber lined	Natural rubber
2 Cast iron	KEL-F
3 Glass lined	Butyl
4 Magnesium	KEL-F
5 Polished bronze	White diaphragm
6 Cast iron*	Neoprene

*For oxygen service a high flash point lubricant is supplied. All valves for oxygen service are subjected to 300 lb. air underwater test.

Features of the Grinnell-Saunders Diaphragm Valve

- diaphragm absolutely isolates working parts from fluid
- diaphragm lifts high for streamlined flow in either direction
- diaphragm presses tight for positive closure
- body, lining and diaphragm materials to suit service
- simple maintenance—diaphragm easily replaced

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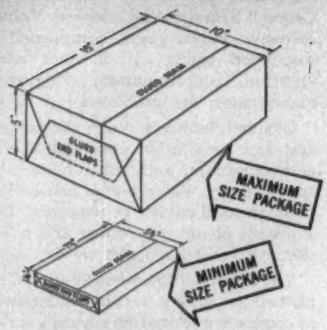

This Morpac style end fold uses 25-40% less kraft wrapper than usual hand wrapped style.

No sealing tape is required.

Cold glue seams pressed flat under thermostatically controlled heater plates, give trim, square packages and instant drying.

PAR AIR COMPRESSOR

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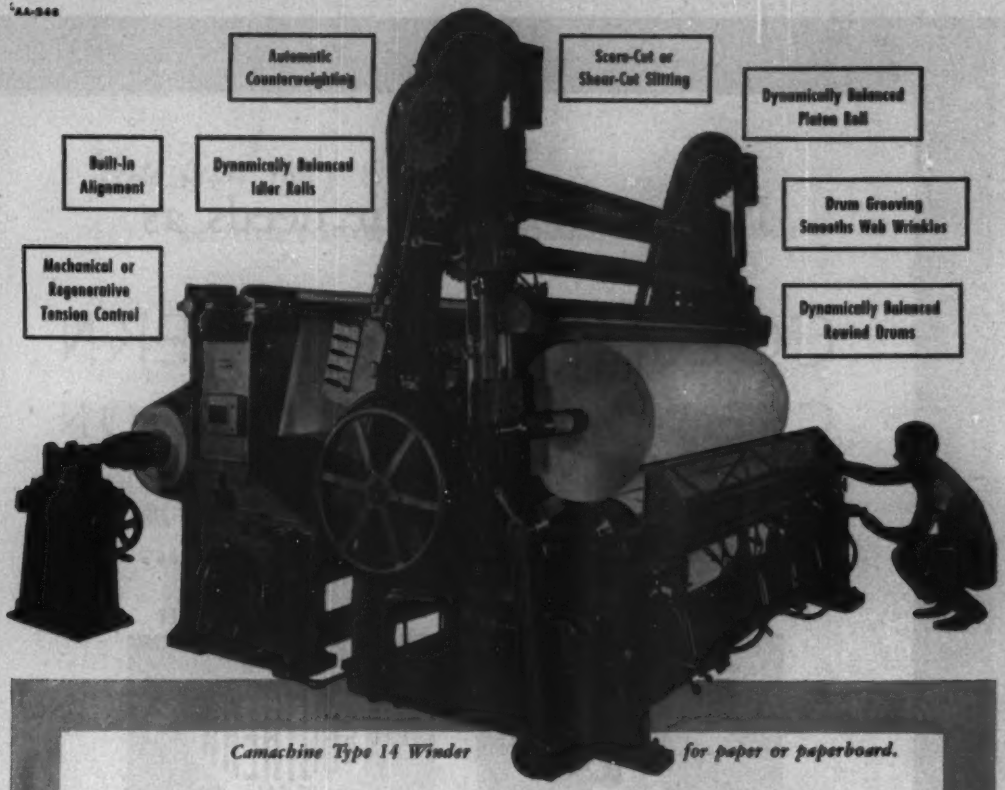
VALUE in a fine product reflects the experience and skills of its makers.

VALUE in Fourdrinier wires is a matter of record... paper quality and production records in mills throughout America reflect the fact that *Appleton Wires are Good Wires!*

APPLETON WIRE WORKS, INC.
APPLETON • WISCONSIN

AA-948



Camachine Type 14 Winder for paper or paperboard.

Why do so many more mills depend on *Camachines*®?

One practical reason is that Cameron Machine Company provides a choice between *four* great, job-proved mill-type Camachines . . . each designed to meet a specific range of speed and capacity requirements . . . each backed by Cameron's half century of *specialized* experience.

CAMACHINE TYPE 20. Dynamically balanced to the maximum speed of 5000 fpm. Trim widths from 180" to 310". Built to your choice of 42", 60", or 72" maximum rewind diameter.

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NOW look for THIS TRADEMARK to assure the same high quality in alkalies and related chemicals...

A wholly-owned subsidiary of
PITTSBURGH PLATE GLASS COMPANY

You can rely

on the same experienced organization

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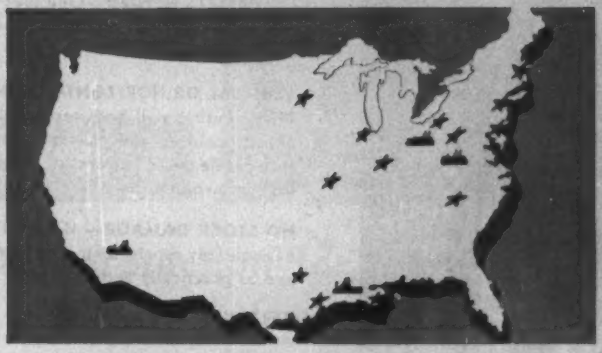

Production at all plants is being maintained at the highest possible levels in order to help meet the current requirements of industry.

And the same district offices will continue to provide facilities that assure the most careful attention to the needs of your business.

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✔ **ADJUSTABLE CLAMP PRESSURE**—Grip is safe and positive, yet pressure can be changed for different papers, and automatically compensates for variations in winding tension of rolls.

✔ **NO PALLETS NEEDED**—One user saves 20% in space alone because no dunnage strips or pallets are required.

✔ **VERTICAL OR HORIZONTAL HANDLING**—This Elwell-Parker will both carry and stack rolls in either position, and can save time by rotating rolls while truck is traveling. In vertical tiering flats are avoided.

✔ **NO STOCK DAMAGE**—Many E-P roll handlers have quickly repaid their cost by reducing spoilage to practically zero.

GREATER "KNOW-HOW"—Elwell-Parker's experience in the specialized field of roll paper handling is *unequalled.* The unit illustrated is only one of many devices for this work that Elwell-Parker has pioneered and perfected in the last 30 years. E-P engineers understand the problems of winding tension, types of wrapping, and kinds of paper from tissue to kraft. As a result, E-P trucks can deliver *more perfect* rolls to the press or box-making machine.

FREE, ILLUSTRATED BULLETIN. *Write for E-P Reporter No. 8. The Elwell-Parker Electric Co., 4191 St. Clair Ave., Cleveland 3, Ohio.*

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POWER INDUSTRIAL TRUCKS
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4. Excellent oiliness characteristics—reduces frictional resistance, wear, and power costs.
5. Clean—does not carbonize at high operating temperatures.

These are the reasons why users report less grease consumption, fewer bearing replacements, and lower maintenance costs after switching to the new improved Gulf Block Grease.

Call in a Gulf Lubrication Engineer today and ask him to give you further details on this quality block grease. Perhaps he can help you get better lubrication of your grease-lubricated dryer roll bearings. Write, wire, or phone your nearest Gulf office today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pa.

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1901 GULF 1951
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BALANCED REGULATION

with the **BRAMMER** *recording consistency control*

BRAMMER CONTROL

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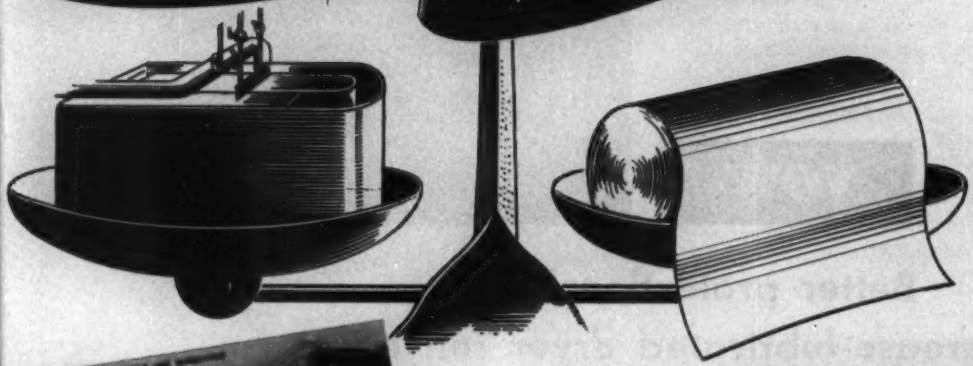

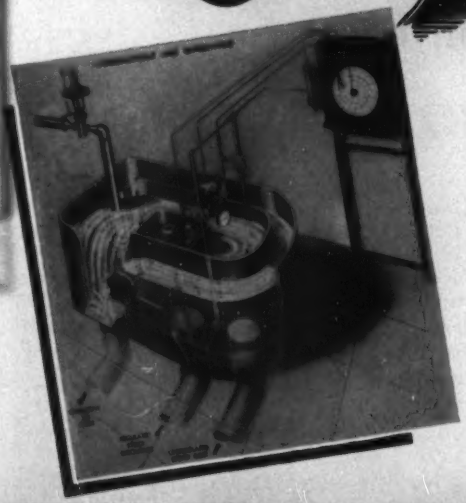

Is maintaining just the right mixture of pulp and water, at any particular point in your process, a problem in your mill? You can depend on the Brammer to accurately regulate and control stocks to meet your specific requirements and to assure exact uniformity and quality.

You don't guess with the Brammer . . . you actually see and know the measurements by observing the chart on the Foxboro Control instrument.

Wherever dependable consistency control is required in the mill, you can rely upon the Brammer to maintain the predetermined and desired consistency with accurate control within ±1/10th of 1%.

Brammer catalog upon request

Patented and patents applied for in U. S. A. and foreign countries.

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On Farrel Paper Mill Equipment

Any of these bulletins will be sent to you on request. Just fill out the coupon and mail it today.

Almost a century of experience lies behind the design and manufacture of Farrel paper mill equipment. The company was one of the first to make chilled iron rolls in the United States and pioneered in making rolls for paper mills.

Today, the world's largest specialty roll shop is located at the Farrel plant in Ansonia, Connecticut, which also has complete, modern foundry facilities, and machine and erecting shops for producing the following products for paper mills:

ROLLS — Farrel rolls are furnished in sizes from 5" to 72" in diameter and up to 312" face length. They are made of various metals and metal alloys to suit different paper mill requirements. Send for Bulletin 116.

CALENDERS — Farrel paper-machine calenders can be made with rolls in any face length up to 312". Board calenders are also available in a wide range of sizes, designed to suit your requirements. Bulletin 117 describes both types.

ROLL CALIPERS — Farrel roll calipers provide the quickest and most accurate means of checking roll diameter and crown, either when the roll is in or out of the grinder. They are made in five sizes for rolls from 4" to 50" in diameter. Write for Bulletin 112.

ROLL GRINDERS — Farrel two-wheel roll grinders, incorporating the exclusive swing-rest principle and equipped with the Farrel patented crowning device, are available in two sizes for roll diameters up to 32" and 42", any length required. Detailed description contained in Bulletin 118.

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PJ

FARREL-BIRMINGHAM COMPANY, INC.
Ansonia, Connecticut

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....Bulletin 117 "FARREL PAPER-MACHINE AND BOARD CALENDERS"
....Bulletin 112 "FARREL INDICATING CALIPER"
....Bulletin 118 "FARREL TWO-WHEEL, SWING-REST ROLL GRINDERS"

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City..... State .....

Confidence grows on Trees!

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HAM FELZ says:

It's what you don't see that counts

Speaking of wet felts, of course. Most of them look pretty much alike at first glance. But it is what you don't see that counts. For example, the *weave* —the spaces between the threads where the water is supposed to come through.

Some felts are so close-woven that the presses can't squeeze very much water through them. Consequently you have to pile a powerful head of steam into the drier rolls and slow down your machine.

That's not my idea of how to make paper or board in a sellers' market. Use Hamilton Felts! They sure do put out water like a sieve. And fast! The man who sells them knows which particular weave is best for me—and for you, too.

Hamilton Felts

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

MIAMI WOOLEN MILLS

Established 1858

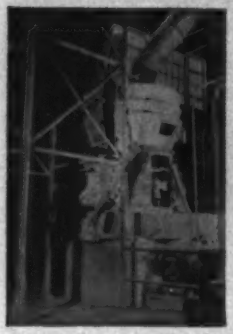
SHULER & BENNINGHOFEN, HAMILTON, OHIO

KAOLIN CLAY FACTS...*for Paper Makers*

NUMBER 11 OF A SERIES FROM THE J. M. HUBER CORPORATION LABORATORIES
COMPLETE SET OF THIS SERIES AVAILABLE ON REQUEST

CLAY MINING TODAY—Modern large scale operations require high powered equipment for removal of overburden and mining of clay. Stripping of dirt is accomplished by either mechanical shovels, drag lines, elevating graders or by tractor and pan. Dirt is hauled to dump either by truck, large semi-trailers or conveyor belts. Clay is mined in open pits with high powered mechanical shovels and transported to the plant either by trucks, large semi-trailers or, in some cases, narrow gauge railroads. At the plant, the crude clay is reduced to small lumps by roll crushers or similar devices and stored, according to grades, in separate sheds.

Stripping overburden at a Huber mine.



Raymond pulverizing mill used in dry, or air-flotation process.

PROCESSING CLAY BY THE DRY METHOD—Airfloated clay is made by the dry process, which involves pulverizing the dried crude clay and separation of excessive coarse impurities, the particles of desirable fineness being lifted from the grinding chambers by air currents, while the coarse particles are rejected from the upward stream by whizzer type separators. Air-flotation plants consist essentially of a rotary type dryer, a high side Raymond Roller Mill with whizzer separator, a cyclone collector and bin, and a means of conveying the finished product to storage or car.

The crushed crude clay, containing approximately 20-25% moisture, is fed in a uniform continuous stream into the rotary dryer from which it emerges at a moisture content of 1-2%. The dried crude clay is elevated to a storage bin which feeds directly to the Raymond Mill. Pulverization of the clay is accomplished by means of the centrifugal pressure of the mill rollers exerted against a bull ring.

Have you received your copy of "Kaolin Clays and Their Industrial Uses"—new Huber 144-page technical reference book? Write on your company letterhead.

MODERN COATING METHODS—There are two main types of coating methods: 1) those which apply the coating film after the base stock has been manufactured, the coating equipment being entirely independent of the paper machine; and 2) those which apply the film while the paper is being produced, the coating equipment being an integral part of the paper machine. The terms "off the machine" and "on the machine" are generally used to describe the two methods.

Clay is the predominant pigment used in coating. Coating clays are especially light colored and of specified particle size distribution. Depending upon the desired effect, the clay is used either alone or in combination with other pigments. When such a paper is calendered, the result is a smooth, even-textured surface, with a micro-porosity which helps to absorb the ink vehicle—reproducing with remarkable accuracy fine halftone engravings.

Particle Size Distribution of Typical Huber Coating Clays

Micron Diameter	Special Hydratex	Hydratex
Above 10	0.0%	1.0%
5-10	3.3	6.6
4-5	2.8	4.2
3-4	4.8	6.8
2-3	8.6	9.4
1-2	15.4	15.3
0.5-1	17.2	16.0
0-0.5	47.9	40.7
Above 5	3.3	7.6
Finer than 2	80.5	72.0

J. M. HUBER CORPORATION, *100 Park Avenue, New York 17, N. Y.*

MINES & PLANTS—LANGLEY, S. C., GRANITEVILLE, S. C., AND HUBER, GA.

ONE OF THE WORLD'S LARGEST CLAY PRODUCERS

Here's your cure for v-belt confusion...

4 reels of VEELOS can replace 316 sizes of endless v-belts

HAS your v-belt inventory grown too large, too costly and too complicated by too many sizes of endless v-belts? No matter what size your inventory, Veelos can cut it—drastically!

Let's assume that you use O, A, B and C widths. With only four reels of Veelos you can make up more than 316 sizes of endless v-belts. If you use only A and B sizes, your entire v-belt inventory will be complete with just two reels. Any length belt is quickly uncoupled from a reel, made endless and installed.

Ease and speed of installing Veelos lowers machine downtime. On drives with outboard bearings, it is installed without moving the motor or dismantling the machine.

FREE VEELOS CATALOG shows how Veelos can bring many distinct v-belt advantages to your plant. See page after page of illustrations of Veelos at work in industry after industry. Full engineering data is given. Write for your free copy today.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 300 distributors throughout the country. Veelos is known as VEELINK outside the United States.

THE SPEED REDUCER THAT SAVES YOU MONEY!

Dodge

Torque-Arm

America's Most Complete Line of Shaft-Mounted Speed Reducers

- No special engineering required. No foundation to provide. No flexible couplings. No sliding base. No "lining-up" difficulties. No expensive installation. Stock TAPER-LOCK sheaves prescribed for each job to provide desired speeds. Application to other machines is practical and easy.
- Unit is driven through any V-Belt Drive. Torque-arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Simple. Positive. Easily installed. Sealed inside the reducer housing.
- Compact, light weight, *rugged*. Quality built by Dodge for Dodge *dependable* service.
- Built in two series—Single and Double Reduction. Capacities from 1 to 27 h. p. Speeds from 12 to 330 rpm. Available from distributors' stocks.
- WRITE for special bulletin A602.

DODGE MANUFACTURING CORPORATION, 2900 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

FIRST
IN POWER TRANSMISSION MACHINERY!

V-BELTS AND TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND RUNNING V CLUTCHES

SOLID STEEL CONVEYOR PULLEYS

"Take the colored boxes up front"

Colored corrugated shipping containers are a bright spot in a desert of nondescript tans and browns. When colored boxes come in, the dealer knows whom they're from—what they contain, and where he wants to put them.

A distinctive *color* becomes associated with a manufacturer or wholesaler. It enhances his prestige with the dealer. And it creates a "family resemblance" among all his products. The retailer can use the colored boxes as a display base.

Show your customers how to profit by a switch to *colored* corrugated containers. Our Technical Staff will help you with dyes specially selected for the job. Write: E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

FOR MAXIMUM ECONOMY
Du Pont basic dyes

FOR MAXIMUM SOLUBILITY
Du Pont acid dyes

FOR ECONOMY AND LIGHT FASTNESS
Du Pont direct dyes

FOR MAXIMUM LIGHT FASTNESS
Du Pont dispersed organic pigments:
Monastral® Fast Blue BWD or BFP Paste
Monastral® Fast Green GWD or GFP Paste
Lithosol® Pigments
®REG. U. S. PAT. OFF.

More color makes more business ...for your customers and you

Du Pont Dyestuffs
DU PONT
BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

Headquarters

for the right answer to your tubing problem

● Now, more than ever, you need the specialized knowledge National Tube Company has regarding pipe or tubing.

For no matter *what* the corrosive conditions in your plant, we can suggest the most economical way to meet them.

Usually it's a simple matter of recorded history. Over the years, our engineers have built up a tremendous file of case histories—dealing with just about every pipe or tubing operating condition. This information is yours for the asking.

It works to your advantage three ways: 1) You guard against using an unsuitable material. 2) You'll save money by being sure your pipe or tubing is the proper grade and economical for the job. 3) If the analysis you need is in short supply, we'll help you select as good a substitute as possible.

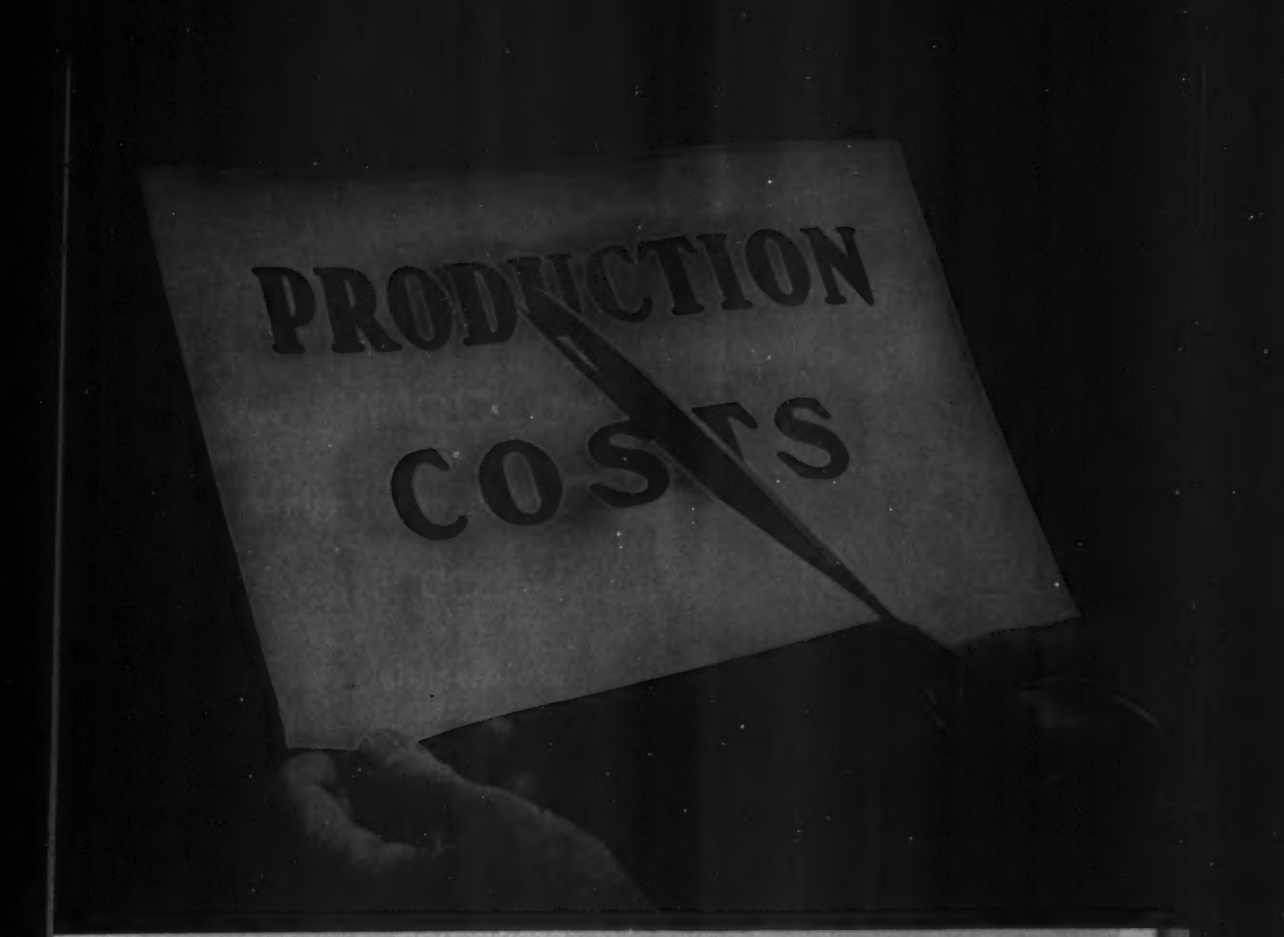
This service doesn't cost you a penny. But it may save thousands of dollars in longer service from the pipe and tubing you're getting. Write today to National Tube Company, Frick Building, Pittsburgh 19, Pa.

USS **NATIONAL TUBE COMPANY**

(Tubing Specialties Division) **PITTSBURGH, PA.**

COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL



Cut Production Costs with Bagley & Sewall Suction Rolls

You can reduce your steam and felt costs . . . and you can increase your tonnage and quality of paper by the installation of Bagley and Sewall Suction Rolls. Those are mill-proven facts.

With the demand today for more and more salable paper, it will be smart to consider the installation of these Rolls. Like all Bagley and Sewall Equipment, Bagley and Sewall Suction Rolls are precision built for better service.

Write us. We'll gladly give you the benefit of our experience.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

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DOCTORS

completely engineered

by LODDING

are essential

for today's

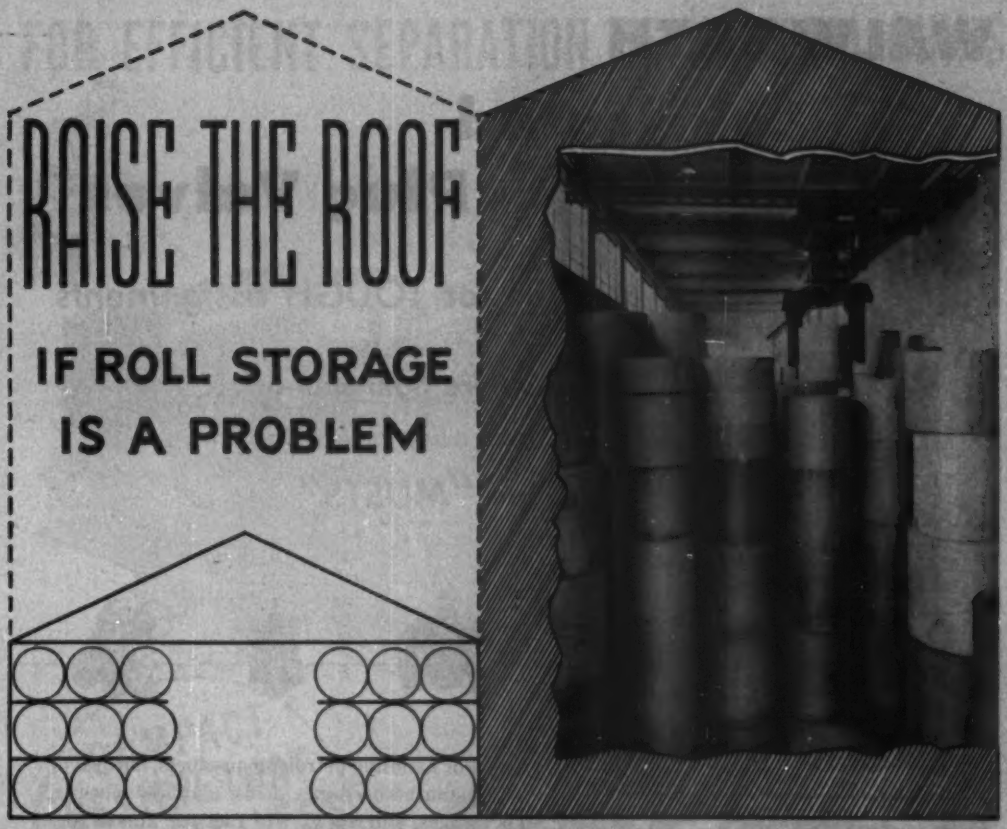
high-speed

production

Lodding Engineering Corporation, Worcester, Mass.
Represented by W. E. Greene Corporation,
Woolworth Building, New York

RAISE THE ROOF

IF ROLL STORAGE IS A PROBLEM



COSTS 25% LESS THAN INCREASING FLOOR SPACE

If you have a roll storage building with low ceiling, extra capacity can be obtained at far less cost by raising the roof than increasing the floor area. The difference in cost usually runs 25 per cent and more—a sizeable saving.

But this is not the only saving. With high head room and a Cleveland Tramrail roll-handling system, the rolls can be stored vertically to heights of 42 feet and greater, and the entire floor area utilized. No aisles are needed. All handling of rolls is done overhead by only one man in the Tramrail cab. Rolls are handled at a fraction of former costs by this method.

Paper spoilage is often a costly factor which is reduced tremendously by the Cleveland Tramrail system. In some mills this alone amounts to a saving of 1% of all paper handled.

Now is the time to make studies of roll storage and handling methods. Why not see what Cleveland Tramrail can do for you? No obligation of course.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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THE CLEVELAND CRANE & ENGINEERING CO.
7127 EAST 287th ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

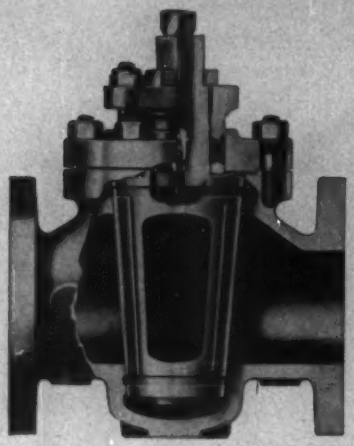
WALWORTH

Lubricated

Plug Valves

for TOUGH assignments

where tight shut-off...
and easy operation
are "MUSTS"



Walworth Lubricated Plug Valves Offer These Advantages

- Complete surrounding of ports with resistant lubricant affords positive seal against leakage.
- Lubricant grooving system assures ease of operation — tight shut-off — greater protection against corrosion.
- Body and plug fully protected by lubricant from attack by line fluids.
- Quarter turn opens or closes valve.
- Made in a complete range of sizes ½" to 26" and for pressures from 175 to 5,000 psi., and for vacuum requirements.

For handling petroleum products, natural or manufactured gas, acids, alkalies, solvents, slimes, slurries . . . in fact for almost any hard-to-handle liquids—there's a Walworth Lubricated Plug Valve designed for the job.

Easy to operate, tight sealing, resistant to wear and corrosion, Walworth Lubricated Plug Valves assure long years of dependable service at low operating cost.

Walworth Lubricated Plug Valves are available in sizes ½" to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements. For full details—prices, sizes, dimensions, and other pertinent data, see your Walworth distributor or write to:

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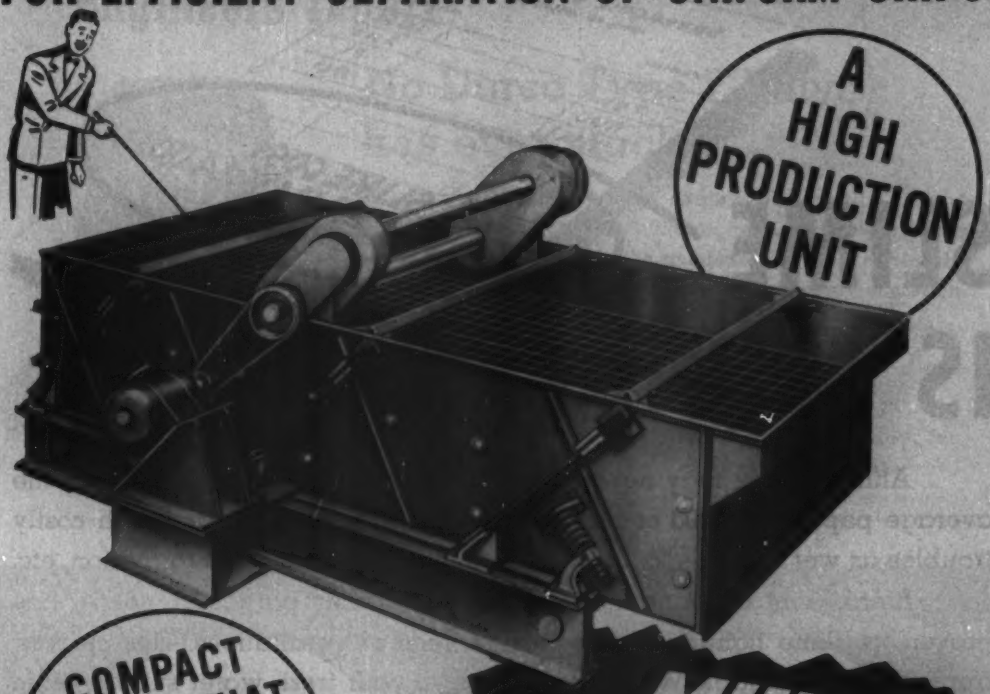
FOR EFFICIENT SEPARATION OF UNIFORM CHIPS



A HIGH PRODUCTION UNIT

COMPACT DESIGN THAT REQUIRES LESS SPACE PER TON CAPACITY

MURCO *Level Vibrating* DOUBLE DECK CHIP SCREEN

Designed as a high production unit for efficient separation of uniform chips from over and undersized, the MURCO Level Vibrating Chip Screen embodies the proper angle of motion to the screen deck through vibrating mechanism designed to give a fast, straight line flow of chips over the screen and at the same time holding the chips on the flat wide side . . . this eliminates up-ending of chips and long slivers, avoiding lodging of these rejects in screen openings.

MURCO Level Vibrating Double-Deck Chip Screen are of double-deck type with solid bottom plate.

All chips are carried on their flat sides in a straight line, so that acceptable chips pass through the top screen deck, rejects and long slivers pass over the top deck. The lower screen deck separates "fines" from the uniform chips and passes the "fines" to a separate conveyor.

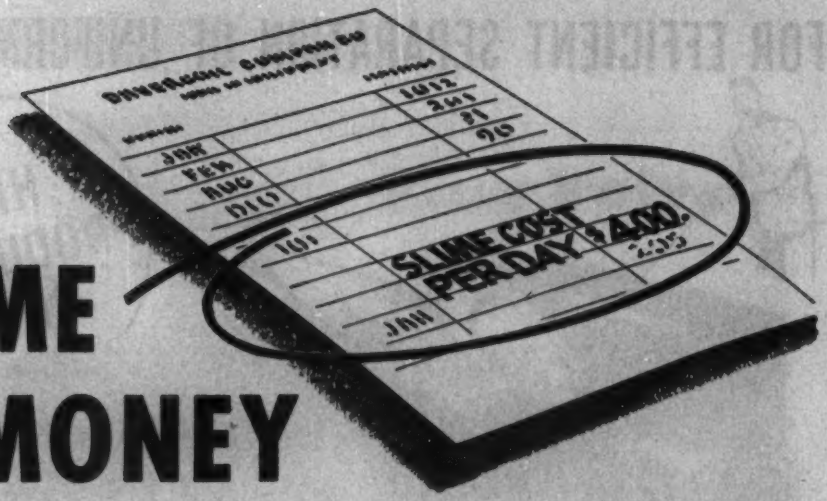
Compact design, and due to its low head room, MURCO Vibrating Double-Deck Chip Screen requires less space per ton capacity.

Write for complete details.

MURCO

D. J. MURRAY MANUFACTURING CO.

Manufacturers Since 1883 WAUSAU-WISCONSIN



SLIME IS MONEY

Although you may never see a bill, studies show that slime costs the average paper mill $400 or more a day and is responsible for such costly troubles as wet end breaks, pin holes, slime spots, poor sheet formation, etc.

Break-Point Chlorination, engineered to your particular needs, has proven its slime fighting ability in hundreds of installations. This process, applied by dependable W&T Chlorinators, to your fresh water supply, often in conjunction with chloramines or other corrective chemicals to your stock or white water, gets results because it destroys the very cause of the trouble — slime forming bacteria. Moreover, members of W&T's nation-wide service organization with over 35 years' experience at their fingertips, carefully engineer each installation, to insure that you will receive maximum protection against slime at the lowest possible cost.

Your nearest W&T Representative will be glad to give you full details on how Break-Point Chlorination can cut your slime costs. Call him today.

WALLACE & TIERNAN
COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

Engineers report:

"No Durco Type F Valve has ever stuck!"

A year and a half of careful checking of several thousand Type F valves in actual installations has not revealed a single case of sticking. Even in the toughest chemical service, the Teflon sleeve prevents freezing and insures ready operation.

Let us send you all facts about this sturdy, simple corrosion resisting valve.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

A product of
The Duriron Company, Inc.
Dayton, Ohio

Manufacturers of corrosion resisting equipment exclusively since 1912.

Sizes: ¼" to 2"
Flanged ends

Sizes: ¼" to 2"
Screwed ends

Sampling valve
male or female
connection

Write for Bulletin 647

TAYLOR'S NEW BI-ACT* CONTROLLER GIVES

HERE'S A NEW, inexpensive controller with *two* control responses, proportional and automatic reset, both adjustable with *one* stability knob. It's the ideal instrument for dependable, accurate control on applications where the three-response quality of Taylor's famous TRI-ACT* Controller isn't essential.

HERE'S WHAT YOU GET:

1. Single knob adjustment of both proportional and reset.
2. Simple stability "tune-in".
3. Wide adjustment range: Gain 100 to .5, or 1% to 200% throttling range.
4. Automatic reset from 0 to 100 repeats per minute.
5. Greater air capacity for faster control action.
6. Choice of local or panel mounting.

This new BI-ACT Controller is the latest addition to Taylor's famous TRANSET* Control System, the new concept in pneumatic control that is the talk of industry. Three component units, TRANSAIRE* Transmitters, TRI-ACT or BI-ACT Controllers and TRANSET Recorders or Indicators, work together as a team to take full advantage of each other's superior performance in controlling *any* process variable.

For full details on how you can profit from Taylor Control, see your Taylor Field Engineer, or write: Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow, liquid level, load, speed and density.

Taylor's Centennial ACCURACY FIRST SINCE 1851

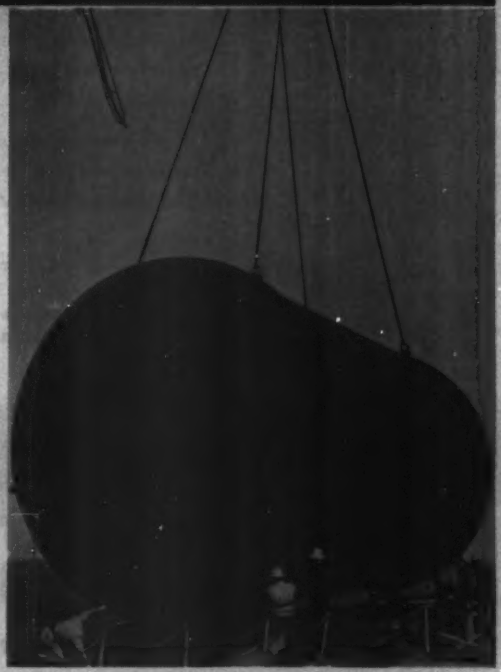
*Trade-Mark

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

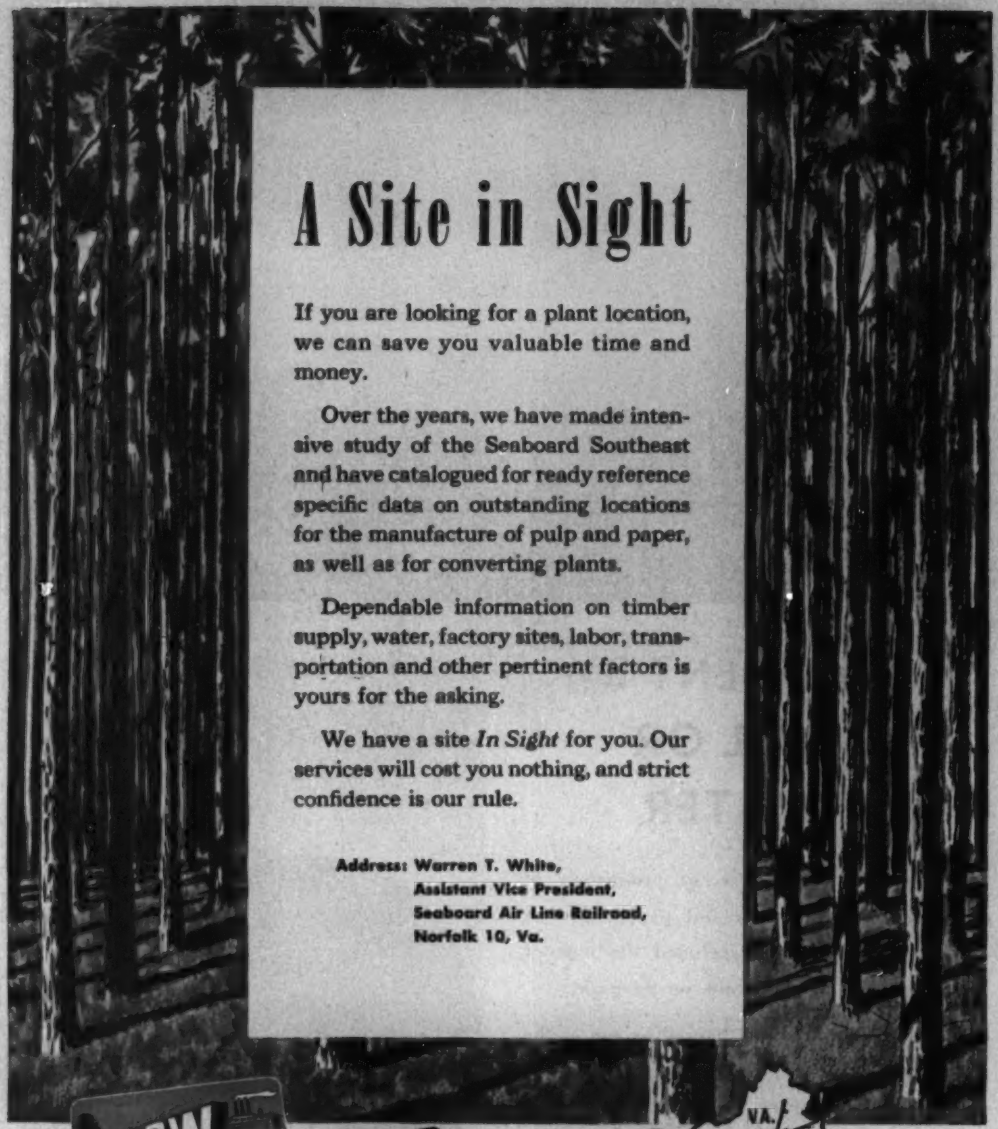
SHIPMENT BY RAIL OR WATER

A portion of the recent production of equipment for pulp and paper mills at Newport News has included the digester above and the flow tank on the right.

The flow tank was delivered by use of the deep water facilities at Newport News, while the digester was shipped by direct rail transportation. Shipment was expedited in both instances by use of these facilities.



NEWPORT NEWS
SHIPBUILDING AND DRY DOCK COMPANY
Newport News, Virginia



A Site in Sight

If you are looking for a plant location, we can save you valuable time and money.

Over the years, we have made intensive study of the Seaboard Southeast and have catalogued for ready reference specific data on outstanding locations for the manufacture of pulp and paper, as well as for converting plants.

Dependable information on timber supply, water, factory sites, labor, transportation and other pertinent factors is yours for the asking.

We have a site *In Sight* for you. Our services will cost you nothing, and strict confidence is our rule.

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Assistant Vice President,
Seaboard Air Line Railroad,
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GROW with the GROWING SOUTHEAST!

SEABOARD AIR LINE RAILROAD

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THROUGH THE HEART OF THE SOUTH

CLARK-AIKEN

Conventional

TYPE LAYBOY

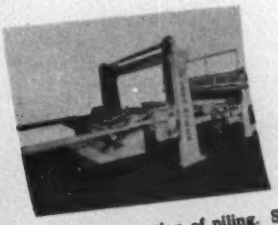
Heavy cast end frames, large-section rolled steel shapes, anti-friction bearings throughout for smooth, vibrationless operation, less broke, at higher speeds. Efficient roller-chain and sprocket lowering . . . trouble-free . . . fast return. Upper and lower limit switches. Independent-motor-driven, cam-operated joggers. Scale setting of joggers and slitters for accurate alignment without use of tape measure. Automatic lowering. Lowering speed adjustable to pile height growth.

CLARK-AIKEN

Overhanging

TYPE LAYBOY

Skids rest on heavy-wall tubes which ride in stirrups supported by steel cables. At maximum pile height, skids rest on floor and tubes are easily withdrawn. Design permits greater pile height and side pile removal . . . ideal for applications where end pile removal is not desirable. Heavy cast inverted-L end frames, large section rolled steel shapes, anti-friction bearings for smooth, vibrationless operation. Independent-motor-driven cam-operated joggers. Scale setting of joggers for accurate alignment without tape measure. Automatic lowering, lowering speed adjustable to pile height growth.



CLARK-AIKEN

Vickery

TYPE LAYBOY

A new conception of piling. Skids rest on floor and remain stationary. Delivery, actuated by hydraulic cylinders, rises as pile height increases. Skids may be removed from sides or end or removal and replacement may be speeded by track system. Delivery quickly drops to starting position after pile removal. Heavy cast end frames . . . large-section rolled steel shapes . . . anti-friction bearings throughout . . . simple, trouble-free hydraulic system. Lifetime tapes in delivery. Independent-motor-driven cam-operated joggers. Scale-setting of joggers. Automatic lowering; speed adjustable to pile-height growth.

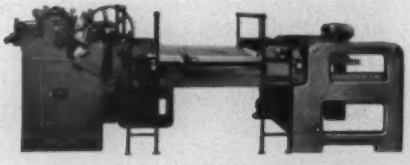
you can have a layboy exactly suited to your needs with any

Clark-Aiken

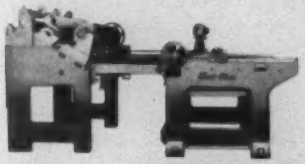
HIGH-SPEED PRECISION CUTTER-LAYBOY UNIT

- First to coordinate cutter and layboy design.
- First to offer a complete cutter-layboy and overlapping delivery unit line.
- Clark-Aiken is the first and only manufacturer offering a choice of three types of layboys—one exactly suited to your needs.
- Clark-Aiken engineers will gladly assist you in selecting the cutter and layboy which will do the best job for you. Write, wire or phone The Clark-Aiken Company, Lee, Massachusetts.

TYPE H CLARK-AIKEN HEAVY DUTY CUTTER-LAYBOY UNIT for high-speed cutting of board or pulp, multiple sheeting. Simplex or duplex, 70" to 220", inclusive, with or without overlapping delivery.



TYPE C CLARK-AIKEN SUPER-SPEED PRECISION CUTTER-LAYBOY UNIT for extreme accuracy in finishing room service. Simplex only, 70" to 113", inclusive, with or without overlapping delivery.



TYPE D CLARK-AIKEN HIGH SPEED ECONOMY CUTTER-LAYBOY UNIT for finishing room service and use of converters and printers. Simplex only, 38" to 100", inclusive, with or without overlapping delivery.

A RESEARCH CORPORATION COTTRELL

will save you $1000 to $1500 worth of salt cake every day

The engineer from Research Corporation spoke confidently. He had studied the equipment layout, and noted that the mill had a capacity of 1,000 tons of pulp per day. From his experience and specialized knowledge he knew that he could safely anticipate a minimum recovery of 100 pounds of salt cake for each ton of pulp produced—total: 50 tons of salt cake per day—value: $1,000.00 to $1,500.00 per day dependent upon salt cake cost prevailing at the plant.

Performance like this is the result of over 35 years of experience combined with careful engineering appraisal, attention to details and a remarkably efficient method. These, plus equipment which gives recoveries of 90 to 99%, are responsible for outstanding records of recovery.

If you are losing your chemicals through the stack in a soda or sulphate mill investigate the Research Corporation Precipitator.

RC-104

Research Corporation Installations

47 CARBON BLACK PLANTS
200 METALLURGICAL INSTALLATIONS
203 ACID PLANTS • 34 PAPER MILLS
262 DETARRING INSTALLATIONS
195 POWER STATIONS
71 STEEL PLANTS • 95 OIL REFINERIES
AND MISCELLANEOUS INSTALLATIONS

RESEARCH CORPORATION

405 Lexington Avenue, New York 17, N. Y.
122 South Michigan Avenue, Chicago 3, Illinois

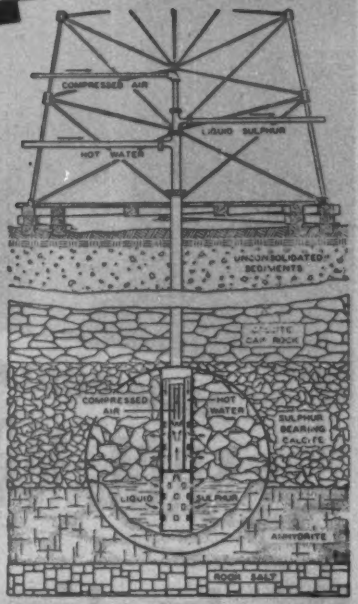
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*WELL PIPING

The well equipment consists of pipes of various sizes, placed one within the other and extending from the surface into the sulphur deposit. A 10" or an 8" casing extends to and rests on the top of the cap rock. A 6" pipe, inside the casing, passes below it and reaches into the barren anhydrite. It is perforated at two different levels, separated by an annular collar. The upper set of perforations permits the hot water to enter the sulphur formation and the lower set permits the entrance of the molten sulphur to the discharge pipe fitted inside the 6" pipe.

When a well is "steamed" the hot water passes down the annular space inside the 6" pipe and outside the sulphur pipe and flows through the upper set of perforations into the porous formation. The entire mass through which the hot water circulates is raised to a temperature above the melting point of sulphur. The liquid sulphur being heavier than water, makes its way downward to form a pool and displaces water around the foot of the well, and rises in the well column through the lower perforations into a 3" pipe which is the sulphur discharge pipe. Compressed air released at the bottom of still another pipe fitted inside the 3" pipe rises and mixes with the sulphur column, forming an air lift which raises the liquid sulphur free of water to the surface.



Loading operations at our Newgulf, Texas' mine

TEXAS GULF SULPHUR CO.

75 East 45th St. New York 17, N. Y. INC.

Mines: Newgulf and Moss Bluff, Texas

ALLIS-CHALMERS LARGE MOTORS ... Combine Protection & Accessibility

MAINTENANCE COSTS are dealt a double blow by this new line of Allis-Chalmers squirrel-cage induction motors. First, its protective design features minimize the need for maintenance operations. Then, its planned accessibility cuts the cost of doing the maintenance work.

How Maintenance is Reduced

In these motors, protection begins with drip-proof construction. But it does not end there. Air discharge openings in the stator yoke are given the added protection of removable louvered panels. Air intakes in the rigid cast iron end shields are located so as to prevent injury to the windings by mishandled tools or other objects. Capsule-type bearing housings protect the bearings and oil supply when the windings are being cleaned. The capsules can remain sealed against abrasive dirt throughout the cleaning operation.

How Costs Are Cut

This added protection has been achieved without sacrificing accessibility. One man can perform all routine maintenance operations. To check the air gap he simply removes a few screw-type plugs from the bearing end shields.

For cleaning, he removes the upper halves of the end shields and reaches right inside the motor with his vacuum cleaner or air hose. And there is plenty of room to reach up back of the stator core through the air discharge openings in the sides of the yoke.

Wide Range of Sizes

These modern-design drip-proof (or splash-proof) cage motors are built in sizes from 60 hp at 300 rpm to 2000 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletin 05B7542.

A-3409

ALLIS-CHALMERS

Interesting Facts about Paper

In the decade 1825-1835, paper was made from hay in France, from peat in Ireland, and from the aloe plant in Mexico—where a law was passed to prohibit the use of any other material for paper.

interesting facts about DIRECT CHINOLINE

DIRECT CHINOLINE is the brightest and greenest direct yellow. Possessing excellent solubility, level dyeing and good light fastness, it is recommended for use in coloring bond, book and cover papers to produce bright canary; or to produce bright greens in combination with Quinizol Blue BP Dustless.

Calco

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION, DYESTUFF DEPARTMENT
BOUND BROOK, NEW JERSEY

NEW YORK • CHICAGO • BOSTON • PHILADELPHIA • CHARLOTTE • PROVIDENCE

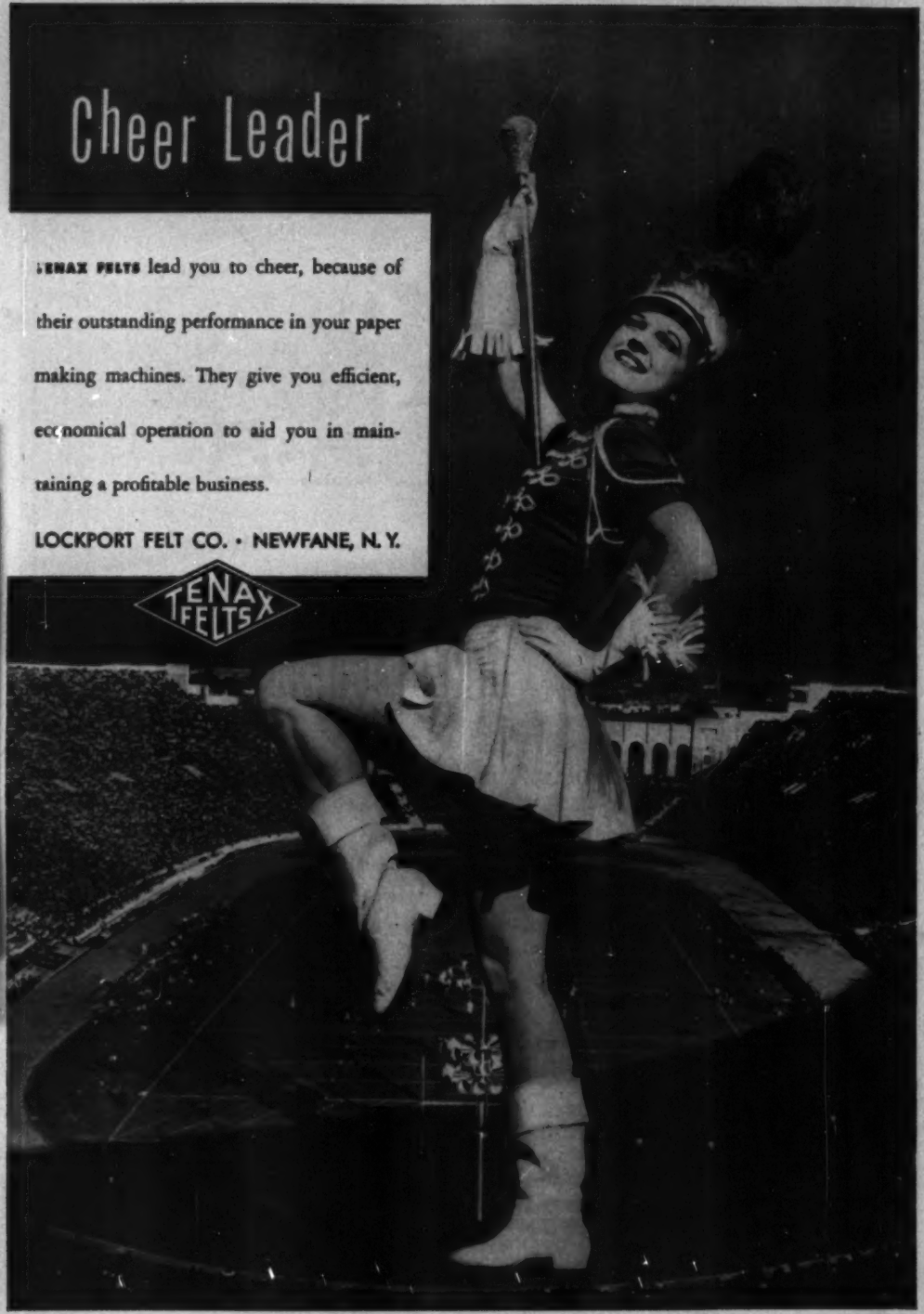
REPRESENTED IN CANADA BY NORTH AMERICAN CYANAMID LIMITED, CALCO CHEMICAL DIVISION
VICTORIA AND SUTE. ST. LAMBERT, MONTREAL 59, QUEBEC
ROYAL BANK BUILDING, TORONTO 1, ONTARIO

Cheer Leader

TENAX FELTS lead you to cheer, because of their outstanding performance in your paper making machines. They give you efficient, economical operation to aid you in maintaining a profitable business.

LOCKPORT FELT CO. • NEWFANE, N. Y.

TENAX FELTS



The MARX SAVEALL

for the efficient recovery of waste fibers from whitewater

A large Ohio container company has installed a Marx Saveall to recover waste fibers from whitewater. This economical recovery process has proven efficient in many installations throughout the country.

The Marx Saveall consists primarily of two large steel cones—one mounted inside the other. Whitewater fed into the top of the unit overflows on to a deseration plate where air bubbles are separated from solid particles. These particles slowly settle to the bottom of the unit and are drawn off. The clarified water rises between the two cones, and overflows a circular weir for reuse.

The Marx Saveall is another specialized structure designed by Chicago Bridge & Iron Company to make new profits for the pulp and paper industry. For details about the Marx Saveall, or other steel plate equipment, write our nearest office.

A Partial List of Other Horton Equipment

ACCUMULATORS
DIFFUSERS
DIGESTERS
PULP WASHING TANKS
SETTLING TANKS
STORAGE TANKS

CHICAGO BRIDGE & IRON COMPANY

Atlanta, 3.....2142 Healey Building
Birmingham, 1.....1509 North 20th Street
Boston, 10.....1064-201 Devonshire Street
Chicago, 4.....2130 McCormick Building
Cleveland, 15.....2205 Guildhall Building
Detroit, 26.....1848 Lafayette Building
Houston, 2.....2143 National Standard Building
Los Angeles, 17.....1561 General Petroleum Building
New York 6.....2232-140 Broadway Building
Philadelphia, 3.....1446-1700 Walnut Street Building
Salt Lake City, 4.....687 West 17th South Street
San Francisco, 4.....1577-200 Bush Street
Seattle, 1.....1368 Henry Building
Tulsa, 3.....1446 Hunt Building
Washington 6, D. C.....1170 Cedrtz Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE

In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

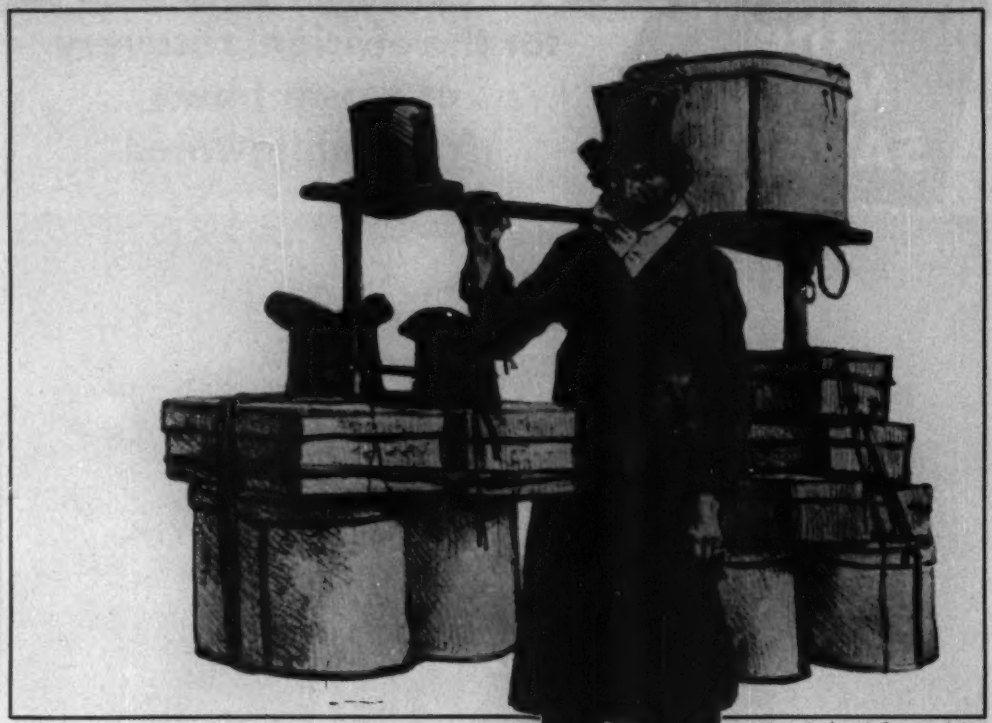


Illustration from the Bettmann Archive

Paperboard Salesman—Model 1810

The French, mindful of their finery, were the first to fashion sturdy boxes of paperboard for ladies' and gentlemen's hats. Built up by hand from multiple layers of paper, the board was shaped and moulded into boxes, some of them finished with a plain glazed surface, some with decorations. Then the salesman with his loaded display of paperboard boxes would call his wares through the streets of Paris.

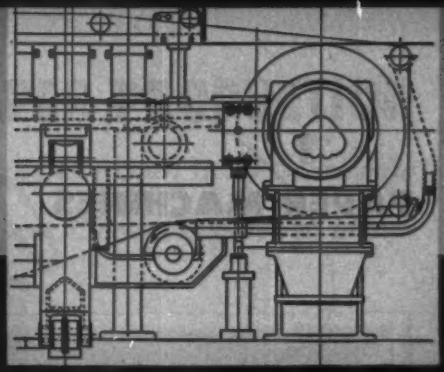
Hat boxes, not much changed in design after 140 years, are still widely used for millinery and men's hats. But the once precious paperboard, now produced by modern high-speed methods, low in cost and plentiful, today protects just about every commodity used by business and the home. For packaging, for shipping, for sanitary protection, for display, for convenience, paperboard cartons and containers are the indispensable carriers of modern merchandise. No wonder paperboard accounts for nearly one-half the total production of the American pulp and paper industry.

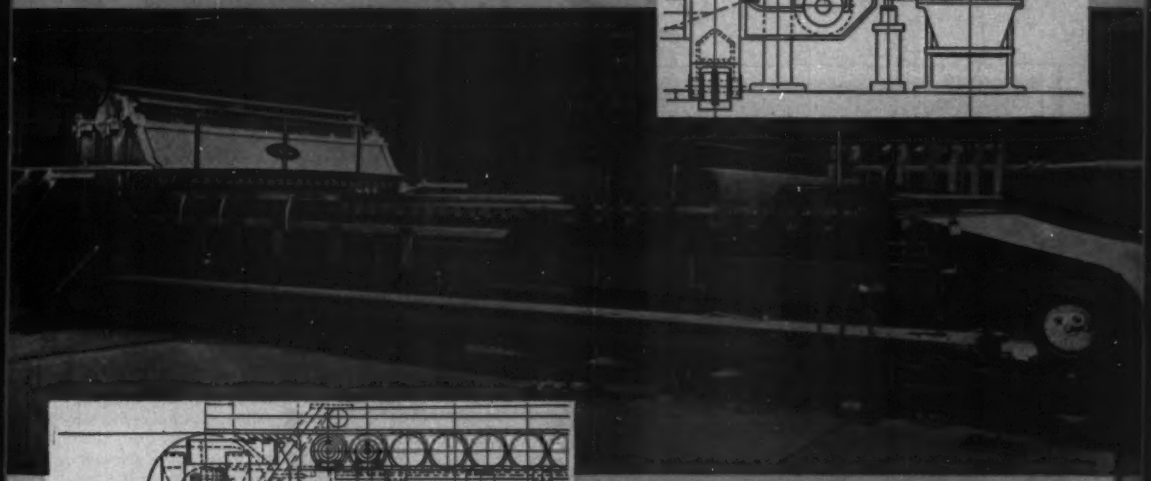
The dramatic story of paper is told in the sound-and-color film, "Paper — Pacemaker of Progress," and in a book under the same title. Both are presented by F. C. Huyck & Sons as a tribute to the Paper Industry. The book will be sent free upon request.

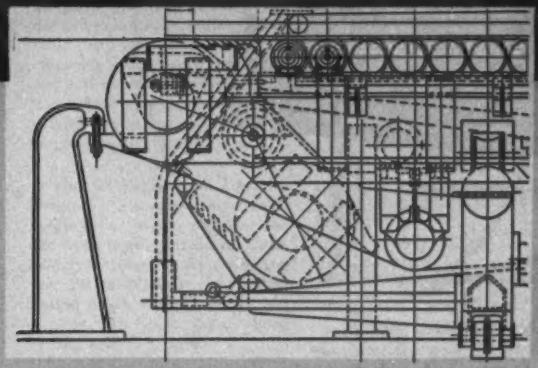
F. C. HUYCK & SONS • *Kenwood Mills* • RENSSELAER, N. Y.

At Right: In the improved "Rapi-Drape" design, the Suction Couch Roll is supported from main Fourdrinier frame as shown. Eliminates need for cantilever jacking arrangement on drive end. Simplifies bearing design and permits use of similar bearings front and back. Eliminates overhang concentrated load on back bearing of suction roll.

Below: Breast Roll is supported from main Fourdrinier frame in the improved "Rapi-Drape" design as shown. Breast Roll, doctor and forming board are raised and lowered as a unit by special hydra-motor. Provides more slack and safer operation when installing new wires. Simplifies and speeds up entire operation.







Above: Fourdrinier Part of "Rapi-Drape" design not including improvements shown in line drawings. Installation at P. H. Glatfelter Co., Spring Grove, Pa.

Improvements IN "RAPI-DRAPE" WIRE HANDLING

Recent changes in the "Rapi-Drape" system have simplified and speeded up the entire wire changing operation.

Suction Couch Roll and Breast Roll are now supported from the main Fourdrinier frame, as illustrated and described above. There is less manhandling. More clearance for draping wires. Less chance of wire becoming wrinkled during installation.

With "Rapi-Drape" Wire Handling, the Fourdrinier remains in perfect alignment, adequately supported at front and back. No danger of deflection stresses and distortion as experienced with complete removal or cantilever change.

"Rapi-Drape" is one of the many design improvements in the new Puseyjones Machines. Write for full details.

"Rapi-Drape" Wire Handling is now being used successfully in these outstanding mills:

P. H. Glatfelter Co., Spring Grove, Pa.
Southland Paper Mills, Inc., Lufkin, Texas
Hollingsworth & Whitney Company, Mobile, Ala.
Southern Advance Bag & Paper Co., Hodge, La.
St. Mary's Kraft Corp., St. Mary's, Ga.
Union Bag & Paper Corp., Savannah, Ga. (2)
Hudson Pulp & Paper Co., Palatka, Florida (2)
Southern Paper Board Corp., Port Wentworth, Ga.
Fibreboard Products Inc., East Antioch, Cal.
St. Regis Paper Co., Tacoma, Wash.
Calcasieu Paper Co., Elizabeth, La.
San Rafael Paper Co., Mexico, D. F.
Papierfabrik Utzenstorf, Switzerland
National Newsprint Co., Ltd., India

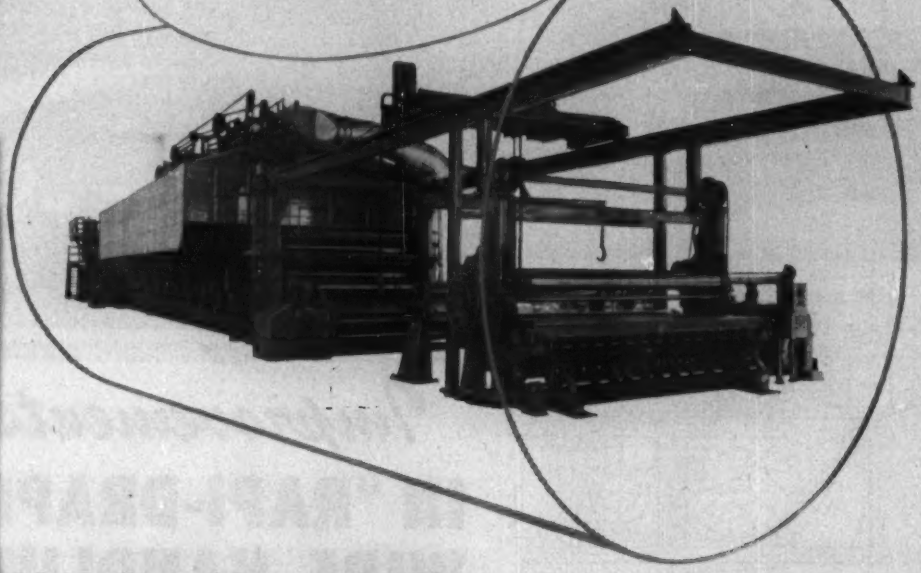
On order for:

Container Corp. of America, Cali, Colombia, S. A.
Brown Paper Mill Co., Monroe, La.
Nekoosa Edwards Paper Co., Port Edwards, Wis.
Union Bag & Paper Corp., Savannah, Ga.
St. Joe Paper Co., Port St. Joe, Fla.

THE PUSEY AND JONES CORPORATION
Est. 1848. Builders of Paper-Making Machinery
Fabricators and Welders of all classes of Steel and Alloy Products
Wilmington 99, Delaware, U.S.A.

THE SIGN OF SUPERIOR QUALITY

PAPER MACHINES *don't* COME IN CARTONS...



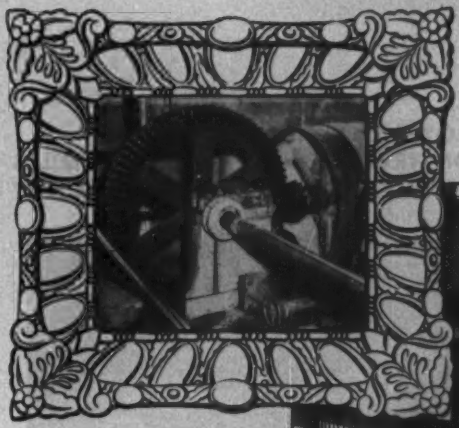
Each Rice Barton machine is engineered and built to do a specific job and to fit the requirements of space, location and production.

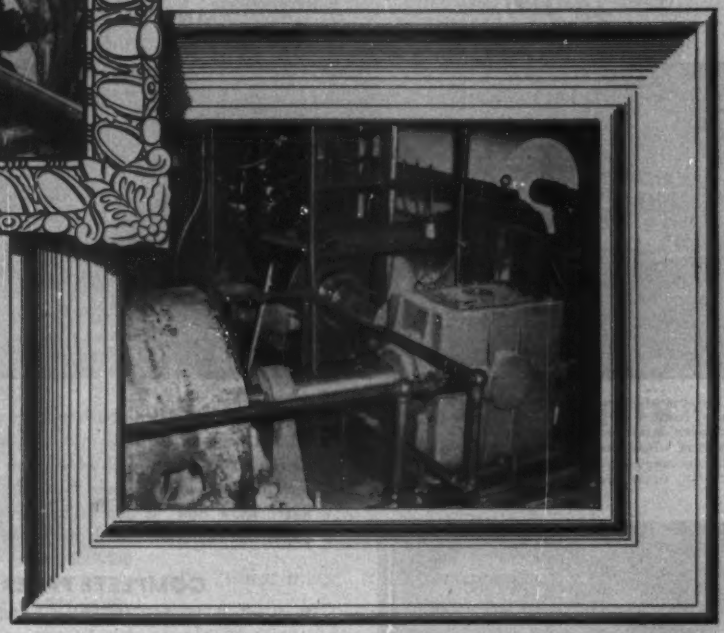
That's why Rice Barton machines have won so many friends in mills where costs, quantity and quality count.

Whether you make heavy board for cartons or the fussiest, thinnest paper for radio condensers, we would like to work out your problems with you. Please write:

INCREASE PAPER PRODUCTION

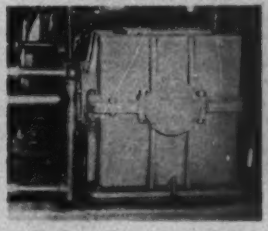
by Replacing Old Open Bevel Gears with Pacific-Western Special Engineered Drives





The uneven performance of the old and unsightly open bevel gear drive shown above was the reason for paper breakage at the calender in a well-known western paper mill. Gear teeth were worn and efficiency was sharply reduced in spite of increased maintenance and lubricant costs incurred in attempting to prolong the life of the outmoded drive.

A special engineered Pacific-Western BS-8 spiral bevel right angle drive (right) replaced the old open bevel gear drive. Completely enclosed in its own case, the Pacific-Western drive illustrated below is designed for 150 h.p. at 292 r.p.m. input speed with a 2.68 to 1 ratio.



Paper machines today must achieve higher speeds in order to meet the demand for greatly increased paper production. During long periods of continuous operation there is no time to spend on the excessive maintenance required to keep obsolete driving units from slowing down the output of paper machines.

Open bevel gear drives are being rapidly replaced in many mills by efficient Pacific-Western special engineered drives. Immediate elimination of an important cause of paper breakage is secured through the installation of these modern, compact driving units. Most paper machines, without danger of paper breakage, can be speeded up so that an average production increase of 20% can be realized.

Whatever your problem in power transmission, call the Pacific-Western plant or office nearest you. Backed by more than fifty years of service to the paper industry, skilled Pacific-Western application engineers can recommend the correct solution for your needs.

PLANTS • *417 Ninth Ave. S., Seattle 4, Washington*
1035 Folsom St., San Francisco 3, California
2600 E. Imperial Highway, Lynwood, Los Angeles County, California
117 N. Palmer St., Houston 3, Texas

REPRESENTATIVES • *930 S. E. Oak St., Portland 4, Oregon*
Room 211, Chamber of Commerce Building, Denver 2, Colorado
1366 W. Broadway, Vancouver, B. C.

5180

WESTERN GEAR WORKS

Manufacturers of PACIFIC-WESTERN Gear Products

Plants: Seattle, San Francisco, Lynwood, Houston, Portland, Denver, Vancouver, B. C.

Pacific Gear & Tool Works

Again and again...

RUST "Know how"

IS EMPLOYED TO DESIGN AND CONSTRUCT NEW PULP AND PAPER MILLS AND TO MAKE OLD ONES MORE EFFICIENT

The original 200 ton Kraft pulp and paper mill facilities for Crossett Paper Mills, Crossett, Arkansas, were built by Rust in 1936-38. Rust has recently designed and is now completing additions that will practically double the output.

60 ton per day felt mill for Bird & Son, Inc., Shreveport, La., designed and constructed by Rust in 1949-50. A new contract calls for doubling the capacity.

Pulp Washing Plant and Digester Building Addition are part of a major program for West Virginia Pulp and Paper Co., Covington, Va.

RUST experience with both sulphate and sulphite processes repeatedly has been put to work in design and construction by mills manufacturing pulp, paper, wall board, felt and insulation materials. These facilities account for more than 1,000,000 tons of annual production. Rust "know how" is also utilized in such allied activities as bag and paper box factories, bleach plants, etc.

COMPLETE PAPER MILL SERVICE

Service includes ENGINEERING AND SURVEYS: by-product process design; plant design; power, water and waste disposal surveys; wood yard facilities . . . CONSTRUCTION: new plants and auxiliaries or modernization and additions to existing facilities including general construction, piping, and—through a subsidiary—electrical work . . . SPECIALTIES: refractory and acid-proof linings; chimney inspection, repair and erection; equipment and machinery erection; reinforced concrete storage bins; waterproofing of concrete structures.

The Whole Job is ONE Job with a Rust "Package" Contract.

Single, unified responsibility for design and construction means maximum economy and efficiency. Consult Rust—for any job, large or small.

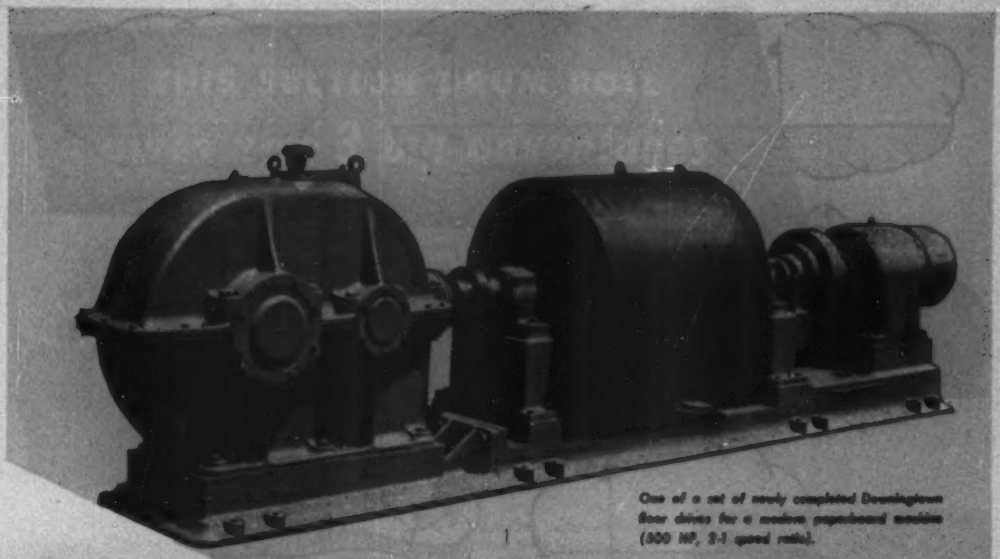
THE RUST ENGINEERING CO.

AND SUBSIDIARY COMPANIES

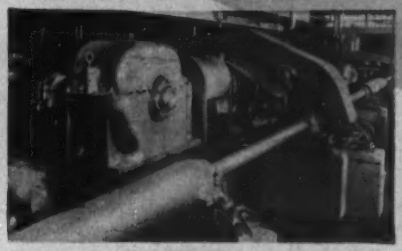
RUST BUILDING — **575 SIXTH AVE.**

PITTSBURGH 19, PA. — **Phone Atlantic 1-8870**

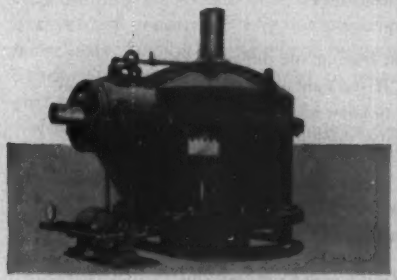
Offices in Principal Cities — United States and Canada



One of a set of newly completed Downingtown Gear drives for a modern paperboard machine (600 HP, 2-1 speed ratio).



Downingtown Spiral Bevel Gear Drives recently installed on a Downingtown roofing felt machine. Note vari-pitch sheaves.



Gear Drive designed for a large capacity Downingtown Fibre Pulper.

keeping paper machinery ···ON···THE···GO!

Downingtown Spiral Bevel Gear Drives are actually "tailor made" for the machines on which they are to be used . . . whether as replacement equipment or when supplied with new machines. Thus, they keep mill machinery "on the go" more economically and efficiently . . . insure proper speed control and a minimum of horse power loss in the transmission of power.

Consult Downingtown on power transmission for mill machinery.

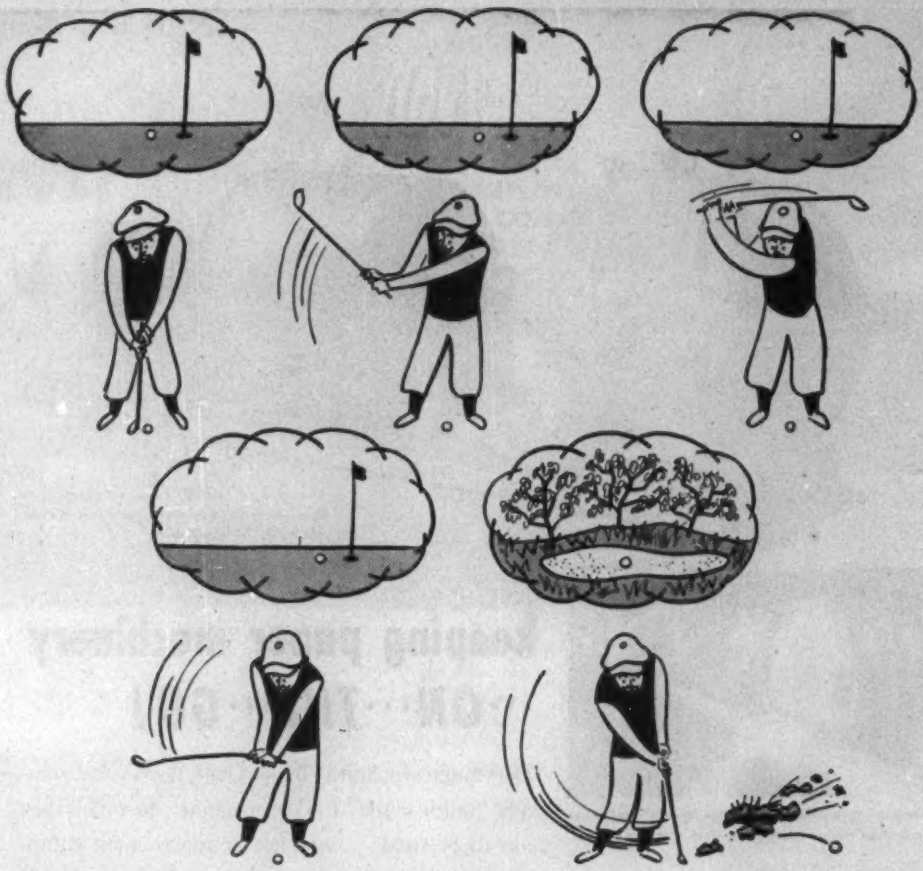
DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.

Pacific Coast Representative: John V. Rosland, Pacific Bldg., Portland 4, Oregon

DOWNINGTOWN

SPIRAL BEVEL GEAR DRIVES

DESIGNERS AND BUILDERS OF PAPER, BOARD AND FELT MACHINES SINCE 1880



Think a stroke ahead

We got that from an old duffer we know.
He'd say, "If you want to get some place on a course
you've got to know where you want to go.
And that takes thinking ahead."

And when your production capacity hinges on
process materials like soda ash, we think it makes sense
to think ahead about a reliable source of supply.

If we can't sell you any soda ash now,
it's because we're serving our customers of record.
But we'll be glad to "think a stroke ahead" with you.
Why not get acquainted?

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE
HYDROGEN • DRY ICE • SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE • PROPYLENE
DICHLORIDE • AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

WYANDOTTE CHEMICALS CORPORATION
Wyandotte, Michigan • *Offices in Principal Cities*

Wyandotte
REG. U. S. PAT. OFF.

THIS SUCTION DRUM ROLL GIVES YOU *3 big advantages*

Install a MANCHESTER Suction Drum Roll and see for yourself how it:

1. **Steps Up Production**
2. **Insures Higher Quality**
3. **Keeps Costs Down**

You will get consistently better water removal and low-cost maintenance through the many engineered features and balanced design of this roll.

Scan the pictures and brief descriptions and you will understand why this improved Manchester Suction Drum Roll can help you produce more saleable paper at lower cost and bigger profit.

Then write for specific information and quotations—and a copy of our new illustrated catalog.

Balanced design at its best. Note these features: Box and shell built concentrically; box can be pulled in running position; smooth, even contact of packing against inner shell bore; pressure of packing against inner shell bore always at right angles to centerline of box and shell; durable stainless feather-weight packing springs, stainless steel studs and nuts.

Here is engineering perfection. Anti-friction roller bearings are ample size and spherical fit. Weight is evenly distributed on bearings. Packing is water-lubricated. Adjusting screws are stainless steel. All parts precision-fitted, assuring long, trouble-free service.

Here you can see how the *grease stays in* and *water stays out*. The forged steel heads have bearings positively sealed against moisture. With this rugged construction you get highest efficiency and insurance against down-time and production losses.

A FEW OTHER MANCHESTER PRODUCTS

Drum Winders • Adjustable Shake Motion • Pope Type Reels • Paper Machine Drives • Size Presses • Drilled Suction Press Rolls • Drilled Suction Couch Rolls • Cylinder Moulds • Complete Fourdrinier • Roll Grinding

THE MANCHESTER MACHINE COMPANY

1709 CENTRAL AVENUE • MIDDLETOWN, OHIO

SPECIALISTS IN PAPER MILL MACHINERY AND COMPLETE REPAIR SERVICE

CONVERT DRIER ROLL BEARINGS FROM BLOCK GREASE TO OIL CHEAPLY, QUICKLY

• Decrease Power Consumption As Much As 20% • Protect Bearings Better • Replenish Lubricant Less Frequently • Cut Lubricant Costs • Reduce Other Maintenance Costs

Drier roll bearings in all modern paper mills are oil-lubricated. Here's why. At best, block grease provides only boundary lubrication. And a block grease which feeds in the right amount where operation is at one temperature, will feed too much on drier bearings running hotter, and too little on those running cooler. In addition, at higher temperatures block grease tends to char and lose its lubricating effectiveness. As a result, in many mills maintenance men have to go from bearing to bearing every day, hand-oiling the grease. Furthermore, with block grease more lubricant is needed, its cost is more, and it has to be replenished about four times as often.

All this adds up to higher power consumption, more frequent bearing failures, and higher maintenance costs. *Conversion of older driers to oil lubrication overcomes all these disadvantages.*

HOW TO DO IT. A simple mechanical device, which can be made in your own maintenance department or any local metal shop, converts drier roll bearings from block grease to oil in a matter of hours. The cost generally runs well under $5 per bearing, and the installations can be made by your own maintenance crew. The savings in time, money and performance will quickly repay the small cost of conversion.

FOR A FREE FOLDER, with photographs and diagrams showing how to make the conversion, fill in the coupon below. Within our marketing area, a Sun representative will call and explain in detail how the conversion is made and what oil should be used for maximum efficiency. To mills outside our marketing area we will be glad to mail the folder as a small contribution to the nation's urgent need for greater paper output.

SUN INDUSTRIAL PRODUCTS

SUNOCO

SUN OIL COMPANY, PHILADELPHIA 3, PA.

SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

Sun Oil Company
Dept. PT-9
Philadelphia 3, Pa.

Please let me have a copy of your folder describing how to convert drier roll bearings from block grease to oil.

Name_____

Title_____

Company_____

Street_____

City_____ Zone_____ State_____

Paper TRADE JOURNAL

TRENDS

Office of the PAPER TRADE JOURNAL, Wednesday, September 5, 1951.

Raw Material Pointers

Weakening in Waste Papers.—Early September prices for Chicago and Philadelphia markets indicate that weakening of price floors is setting in earlier than dealers had hoped, because of much lighter demand from board mills.

In Chicago, old corrugated containers are particularly afflicted, with other grades weakening in natural reaction. Philadelphia's prices also are easier, particularly in new krafts which are dropped by the abundance of unbleached krafts in the market. Ledgers are softer. New York and Boston markets show similar easing in these grades. Others are quotably unchanged at press time.

New Overseas Pulp Ceiling Likely.—A strong likelihood exists that overseas pulp ceilings will get a second rollback, grade by grade, to Canadian levels. An amendment to CPR 49, wood pulp pricing order, which would effect such a rollback is rumored to be on the agenda for early consideration by OPS and its Industry Advisory Committee.

Market Pulp Inventory Deadline

September 1's deadline for market pulp inventories has been reached, and high gearing of NPA's wood pulp order (M-72) is underway. Full effects of the 45 day limit set for domestic pulps (120 days for overseas pulps), plus the 95 percent consumption restriction, will manifest themselves as a more equitable distribution of available supply until the "have-nots" get their pipelines adequately filled.

When this point is reached — and with rapidly increasing domestic capacity this could be nearer than most surmise — liberalization of the inventory provisions will be made by NPA.

U. S. Pulp Output Expanding

Official reports of domestic wood pulp capacity, amended to date, show total production of 17,583,000 short tons for 1951, or a gain of 420,000 tons since January 1, 1951, principal increase being in sulfates with 288,240 tons, and in sulfites with 34,529. Further gains in 1952 total 1,017,000 tons, with 755,259 tons in sulfates, some 51,000 tons in sulfites, 35,000 in soda, 33,000 in groundwoods, the remainder an aggregate of other grades. (Expansion programs which have not yet reached the action stage, and which could result in substantial increases for 1952 and 1953, are not included in these figures. the U. S. Pulp Producers Assn. states.)

Just what portion of this output gain will become available for market pulp consumers is moot, since the major part is in the integrated segment of the industry. However, if—as many students of the market believe—softening of the paper supply intensifies this Fall, aided by drops in paper demand and amassing inventories—then amplitude in integrated pulp supply will develop, unused tonnages will be offered to the market, and the whole market pulp picture will change to one of abundance.

This is a trend which is likely to develop worldwide, with the normal reaction pricewise, observers believe, provided the wood, chlorine and sulfur needs are met. Defense spending will, however, provide a check to the recessive movement.

All this and more, too, goes into the widespread thinking that a further rollback in buying prices of overseas pulps should be seriously considered. Scattered reports from New York agents for Scandinavian mills indicate that such a price cut—which would amount to about $40/65 for bleached grades, $50/55 for unbleacheds, would result in a new loss of overseas pulps to this market. Canadian producers, however, would welcome the rollback as long overdue.

Unbleached Sulfites Strong

Some slight softening has been reported in unbleached sulfite pulps as a result of gearing to the new order. In better grades, this situation has mended and inquiries are being made for supplies. Demand for prime grades is strong. In *news* grades, reports of slight weakness persists.

Groundwoods and sideruns are easy to sloppy, the mills being well supplied through earlier buying of combination deals with wanted chemical grades, as well as with ample supply in the market.

Bleached pulps are strong and in tight supply, though in view of new capacity which coming steadily to the market, it is anticipated by informed sources that some easing will be apparent in 30 to 45 days.

Materials

Casein.—Trading is described as fair to quiet. Supply of domestic is ample for demand; that of the Argentine light but adequate. French and Dutch product is in good supply. Offers of Portuguese, Norwegian and Danish also are reported, with distress selling noted on the latter.

Rumors that buying has been slowed by announcement of Government restriction on casein imports are discounted by informed sources. Current limitations of the order cover the remainder of 1951 and permit entry of five-twelfths of what the importer brought in during the base period; which is to say that he may bring in no more than he brought in during the five months of 1950.

Aimed at increasing the use of domestic casein, the order could be seriously restrictive if extended into early 1952 when the Argentine season is at flush and domestic at ebb. At today's price level, however, casein has steadily lost ground in paper manufacture to the much lower-priced substitutes, and import restrictions cannot reset the fences. By the trade, the limitation on casein imports are held to be unwarranted.

Caustic Soda.—Dry forms are generally scarce, and easing which had been spotty during Summer lull in liquid forms is now expected to tighten.

Chlorine.—Shortages continue to restrict industrial operations. Some easing due with the passing of seasonal water purification demands.

Soda Ash.—The relaxed demand which developed during the Summer is expected to tighten with a Fall pickup. Production is reported to be committed on long-term contracts.

Sodium Bicarbonate.—Supply ample to easy.

Starches: Potato.—Sharply restricted supplies of both the Maine and Idaho product plus prospects of a much smaller potato crop have lifted the starch price one-quarter of a cent a pound. Price is strong at new levels, trading moderate.

Rosin.—Market stiffening which grew out of reports of and final placement of the $400,000 German order has eased somewhat. The German business is reported to have been placed at prices below the present market. Processing plants also are said to be buying at much below the market figure. Demand, however, is so thin that the picture is confused. Many producers are holding either by means of the Government loan or privately. Offerings on the board are light. CCC loan stocks to date aggregate 12,511 drums.

CPR 52, Naval stores pricing order, now carries an amendment which places export sales of these products under export regulations as defined in CPR 61, the export order.

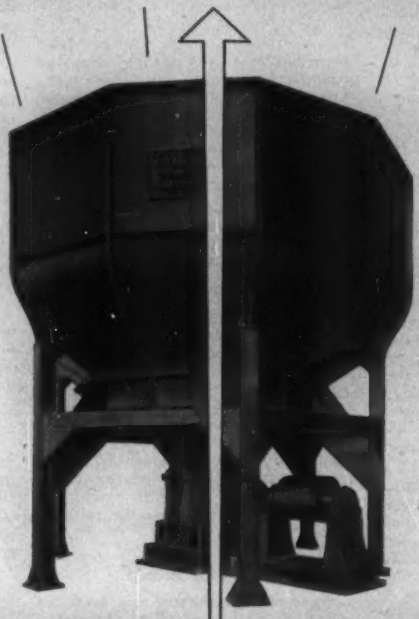
Sulfur.—Discovery of new Louisiana deposits which should yield 500,000 tons yearly by 1953 hold hope to U. S. industry which is feeling the pinch of world demand on U. S. output. Many plans are afoot to increase world production, but since all of these will take time to develop, at a time when demand is increasing, the situation currently is not improved for the short-term outlook. A summary of the sulfur situation will be carried in the *Journal's* next issue.

Paperboard Production (Tons)*

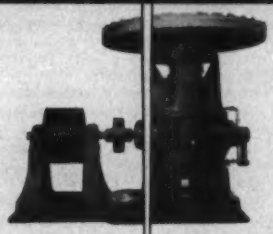
	Aug. 25 1951	Aug. 18 1951	Aug. 26 1950
Production	235,800	223,617	228,119
New Orders	188,010	187,082	211,075
Unfilled Orders	516,856	568,311	645,496
% of Activity	94	93	100

* Source: NPA.

Hydrapulper No. 1000 coming up



Several designs • Full range of sizes • Batch or continuous • Contact Shartle or Dilts



There is no mystery about the sales strength of a Hydrapulper.

In the first place everything acts and reacts in a vertical plane. (1) a firm base. (2) a heavy precision drive on that base. (3) a heavy, rugged rotor directly atop the drive. No side thrust. No stresses or strains—everything in a vertical plane.

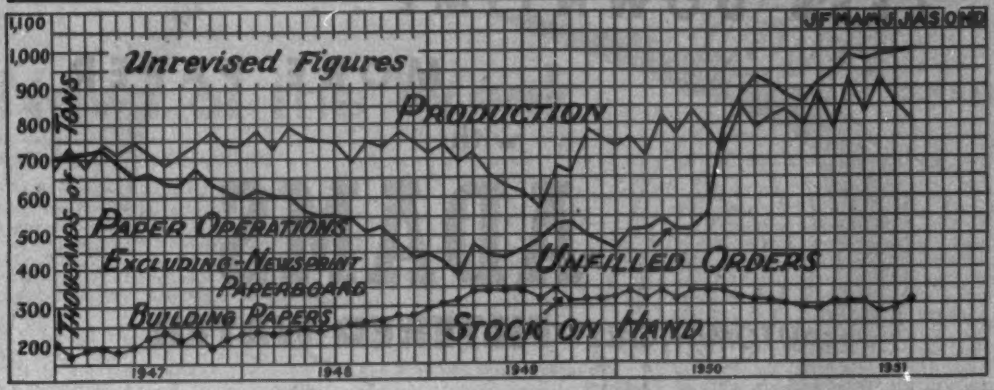
In the second place, the stock travels not sidewise but downward toward the rotor—gravity pull.

In the third place, the top is open, except when pulping under steam pressure, permitting entire bales of waste papers or rolls of virgin pulp to bounce up and down on the rotor until pulped. No strain on rotor or tub that might force something to snap.

In the fourth place, a Hydrapulper is the fastest, most thorough, most economical of all pulpers and almost every mill in the world knows it.

SHARTLE BROTHERS MACHINE COMPANY, MIDDLETOWN, OHIO

DILTS MACHINE WORKS, Fulton, New York • Divisions of THE BLACK-CLAWSON CO., Hamilton, Ohio
Western Sales Office: Mayer Bldg., Portland, Oregon • *Southern Sales Office:* 937 Coventry Road, Decatur, Georgia
Associate: THE ALEXANDER FLECK LTD., Ottawa, Ont. • *Subsidiary:* B-C INTERNATIONAL LTD., Greener House, Haymarket, London, S. W. 1, Eng.



Brief of Important Figures

Source	Production	Week Ending Aug. 25, '51	Week Ending July 28, '51	Week Ending Aug. 26, '50
APPA	Paper Production Percent Capacity[3]	101.7	99.5	100.6
	Unbl. Kraft Paper Production Percent	93.4	97.0	96.8
NPA	Paperboard Operating Ratio Percent Inch Hours	94	97	100
		July 1951	**June 1951x**	**July 1950**
APPA	Paper Production[6] (Except Newsprint and Building Papers) Tons	808,000	891,487	748,000
	New Orders Tons	848,000	889,173	957,000
	Unfilled Orders Tons	1,035,765	984,685	775,090
	Shipments Tons	796,000	893,075	745,000
		July 1951	**June 1951**	**July 1950**
NPA	Paperboard Production Tons	815,547	977,214	745,255
	New Orders Tons	814,729	873,807	890,890
	Unfilled Orders Tons	537,591	547,963	524,391
	Our Customers Activities Index[1]	**Latest Mo.[5]**	**Previous Mo.[5]**	**Year Ago[5]**
FRS	Manufactures Total Index	233	233	209
	Durable Mfg. Index	277	277	238
	Nondurable Mfg. Index	197	197	184
	Chemical Products Index	301	298	258
	Mfg. Food Products Index	164	158	164
	Printing and Publishing Index	170	179	160
ODC	Magazine Advg.-Printer's Ink Index	350	355	321
	Retail Sales Combined Adjusted Index	341.6	348.9	317.9
	Drug Index	234.9	229.8	222.0
	General Merchandise Group Index	319.5	333.6	311.1
	Grocery and Combination Index	440.8	444.3	378.9
	Prices Index			
BLS	Consumers Price Index[1]	185.2	185.4	170.2
	Wholesale all Commodities[2]	181.7	182.9	157.3
	Wholesale Foods[2]	186.3	187.3	162.1
	Commodities other than Farm Products and Foods[2]	170.5	171.7	148.7
	Wholesale Pulp and Paper[2]	196.2	196.2	155.6
	Purchasing Power of Dollar, Consumers Prices[1]	54.0	53.9	58.8
	General Activity Index			
FRS	Mfg. Production-Worker Payroll	429.4	428.3	362.7
	Unemployment Compensation Initial Claims (M)	1,118	908	1,104
	Miscellaneous Carloadings–Thousands of Cars	1,937	1,582	1,845
	Electric Output (Million KW hr.)	34,966	35,136	31,608
PTJ	Average 32 P & P Common Stocks as of Sept. 1	$39.23	$39.12	$32.35

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
[3] New 6-7 day basis.
[4] Per Five Weeks.
[5] For details see APPA Monthly Statistical Summary—July 1951 Estimated Figures
[6] Latest Month Available on Request
x Revised figures.

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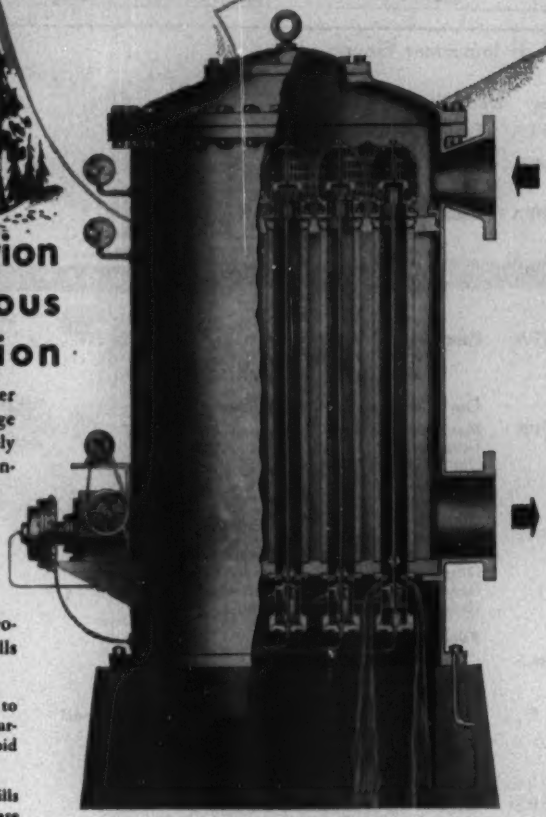

Continuous protection for your continuous machine operation

Higher production goals of today's faster machines must be protected—continuously. Large volumes of water, carrying proportionately larger amounts of impurities, need more attention than ever before.

Clean, automatically filtered water can eliminate down time due to plugged shower nozzles, helps avoid mid-week shutdowns for washing clogged felts.

Experience with Adams Poro-Screen and Poro-Stone Water Filters in pulp and paper mills from coast to coast has proved:

1. Continuous filtration can be relied upon to remove all objectionable impurities, even during seasonal conditions of highly turbid supply.
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Write for your copy of the new 20 page booklet on water filtration in the Pulp and Paper Industry, Bulletin No. 691.

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News of the Week

Paper TRADE JOURNAL

NAT. CONTAINER FINANCING

NEW YORK—A $32,000,000 financing program for major expansion under a government Certificate of Necessity was announced by National Container Corp., already one of the leading completely integrated enterprises in the paperboard and corrugated box industry.

A special meeting of stockholders has been called for September 18, 1951 to vote on a proposed increase in authorized capital stock from 4 million shares of common stock, par value $1, (of which 2,752,482 shares are outstanding) to 4,480,000 shares. The additional authorized 480,000 shares will be $1.25 convertible preferred stock of $25 par value.

The corporation proposes to sell these preferred shares to a syndicate headed by Van Alstyne Noel Corp.

Simultaneously, the corporation will sell $20 million principal amount, of 15-year debentures to an underwriting syndicate headed by Halsey, Stuart & Co., Inc. and Van Alstyne Noel Corp.

The corporation will prepay, from the proceeds of the proposed new financing, an existing loan held by Metropolitan Life Insurance Co. in the face amount of $6,175,000, plus premiums.

Thus, the proposed financing program actually represents the raising of approximately $25 million net new funds by the corporation.

The funds will be used for the construction of a 500-ton per day kraft pulp, board and paper mill to be located near Valdosta, Ga. The Certificate of Necessity will permit the Corp. to amortize 60% of the cost of the new mill, not in excess of $23,165,000, over a five-year period.

The new mill, which it is anticipated will be completed in one and one-half to two years, will increase National Container's annual kraft pulp, board and paper production capacity by more than 50%. In 1950 National's four present pulp and board mills produced a total of nearly 300,000 tons.

The corporation's sales in the first half of 1951 were at an annual rate of almost $80 million. Its net profit for the six months amounted to $5,870,000 after taxes.

PLAN SULPHUR PLANT

OTTAWA—Columbia Cellulose Co. is planning a sulphur plant at its Port Edwards operations which will use iron pyrites from Howe Sound Co.'s wholly-owned subsidiary, Britannia Mining & Smelting Co., where a huge slag pile of pyrites is formed and the pyrites are approximately 50% sulphur.

At present, the pile there is estimated at about 100,000 tons of pyrites and approximately 200 tons are being added to the pile daily. Formerly the pyrites were exported to Japan and France but this may now be changed.

J. & J. ROGERS IMPROVEMENTS

In the sulphite mill, a rearrangement of screens for better efficiency. A new screenings refiner was installed to eliminate screenings waste.

At the bleach plant an additional 6 ton Bellmer has been installed together with a 15-ton tile storage tank.

Among the improvements to the beater room, was the installing of a hydrafiner.

The Fourdrinier has had a size press and breaker stack added. The first Beta gauge installed for basic weight measurement was on this machine.

The finishing department has been enlarged with additional carton storage with inclosed loading platforms.

A new high speed overlapping delivery sheeter is in operation. Two new guillotine trimmers are expected shortly.

WHERE YOUR PAPER GOES

The Kansas City flood dramatized the emergency value of paper cups and containers when washed out pumping stations forced the city to ask householders and non-essential establishments to ration water. The water shortage was especially critical on July 13 because the fire department was coping with a blaze which destroyed seven city blocks of industrial property. On July 14, non-essential establishments were asked to close to conserve water. At the same time, Dr. Hugh L. Dwyer, health director, asked restaurants to use paper service or close.

Paper jobbers and drug companies, which fortunately had an unusually large supply of paper goods on hand because of the 30 days of rain preceding the disaster, rushed supplies to restaurants, hospitals, Red Cross, and Salvation Army. Trailer trucks replenished the City's stock, and the Carpenter Paper Co. chartered a plane to fly in 100,000 cups from Topeka for the Red Cross. Between Friday and Monday, the period of water shortage, 10 million paper cups and plates were used.

TRYS CHEMICAL DEBARKING

The Brown Co., Berlin, N. H. has two crews of 6 men each in a chemical debarking experiment, conducted by the woods department in Twin Brook Valley, northeast of Aziscoos Lake. The men are quick-killing the trees by use of a chemical in order that the bark may become loosened. When the timber is cut about a year following treatment, much of the loose bark will be removed in normal wood-handling and the wood will dry out much more quickly than when cut green. The process is designed to reduce wood-handling and trucking costs and reduce barking problems at the mill. One man in each crew is equipped with a tank mounted on a pack board carried on his back. A rubber tube from this tank runs through a valve to a paint brush which is used to spread a thin, blue liquid over each girdled surface a 6 inch wide band of bark removed from tree 3 feet above ground. The other men of the crews maintain direction and record the volume of the treated lumber.

MAC MILLAN EXPANDS

OTTAWA—H. R. MacMillan Export Co.'s pulp mill at Nanaimo, B. C., will be enlarged so that the bleached sulphate pulp producing capacity of the mill will be more than doubled by 1953, a start in this direction having now been made, with eight digesters to be added to the present four. This program is expected to be completed by late summer of 1953, depending upon availability of supplies.

BUYS AMERICAN CAN EQPT.

Stocker Manufacturing Co., Netcong, N. J. has purchased the complete laminating, coating and saturating equipment of the American Can Co. located in St. Louis, Mo. With this additional equipment, it will round out the complete line of coated, laminated, saturated and chemically treated papers manufactured by Stocker.

It has not been determined whether all of this equipment will be installed at the main plant at Netcong, New Jersey, or some or all at Franklin, Va. As the Camp Manufacturing Co., an affiliate of Stocker, will produce and supply the biggest share of the kraft paper used in its operatiotn, it might be advantageous from a geographic and cost standpoint to set up the equipment adjoining the paper mill.

PRYOR PROGRESS

The structure of National Gypsum Co.'s new paper mill at Pryor, Okla., is about 75% complete, according to Paul Dumas, National's resident manager. Completion of the building is expected in October, with machinery installation to be completed by December.

Steel erection on the plant began June 1, and construction of the 125,000 square foot structure has progressed ahead of schedule in spite of bad weather and equipment and material shortages. The steel, concrete and tile building will incorporate modern employe facilities.

The new mill, planned to integrate western operations, will supply National's gypsum board plants at Fort Dodge, Iowa, Rotan, Texas, and the recently-completed plant at Medicine Lodge, Kansas. The Pryor mill, designed by National's own engineering staff, will produce a special paper liner used in the manufacture of fireproof gypsum board products, including gypsum lath, wallboard and exterior sheathing.

Raw material for the plant will be ground wood, sulphite and several grades of waste papers, which will be converted to the finished product by a 450' long Black-Clawson paper machine. Dumas expects that the plant will give a big boost to the scrap paper salvage business in the Southwest, since the plant will require about 150-200 tons of raw materials daily.

As part of the company-wide effort to reduce stream pollution, a "Save-All" unit will be installed to clean waste water leaving the plant, it was announced. Paper fibre thus recovered will be pumped back into the processing operation.

COTTON LINTERS PRICES

OPS has set a dollar and cents ceiling price on 15 grades of linters for the Southern Chemical Cotton Co. The prices range from 25.7 cents to 30.3 cents per pound.

Florida's Forestry Instruction Camps

For many years the State forest services in the South have been conducting annual forestry camps to instruct boys, particularly those who are members of the Future Farmers of America, in practical forestry principles. These instruction camps have had the financial and moral support of pulp and paper companies and others interested in the preservation and propagation of woodlands.

The movement is believed to have originated in Florida, where the seventeenth annual forestry camp was recently conducted by the Florida Forest Service. Instruction was in charge of William S. Chambers, Jr., chief of the information and education section of the Florida Forest Service. During the first week 112 boys attended, while in the second week there were 105.

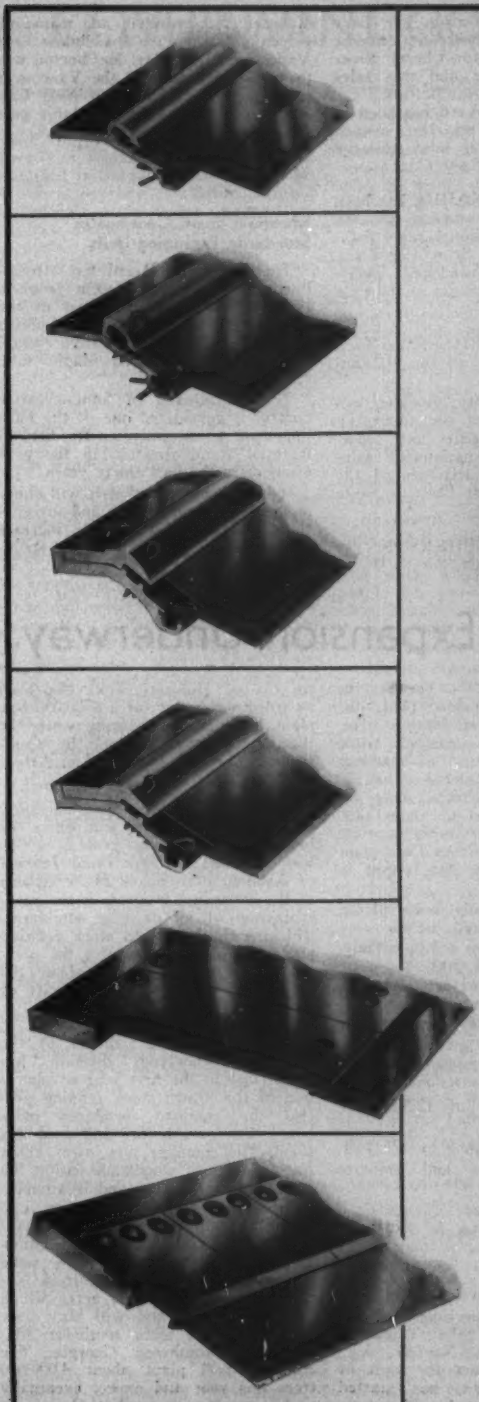
Sponsors of the Florida camp, all members of the Southern Pulpwood Conservation Assn., were: Container Corp. of America, Fernandina; National Container Corp., Jacksonville; International Paper Co., Panama City; Rayonnier, Inc., Fernandina; St. Joe Paper Co., Port St. Joe; St. Regis Paper Co., Pensacola; American Turpentine Farmers Assn., Valdosta, Ga.; Alger-Sullivan Lumber Co., Century; Brooks-Scanlon, Inc., Foley; Granger Lumber Co., Inc., Lake City; Hudson Pulp & Paper Co., Palatka; Neal Lumber & Manufacturing Co., Inc., Blountstown.

While the course is too short to permit of thorough teaching of forestry principles, the fundamentals are strongly stressed. Such subjects as the use of forestry tools, method of determining the height of trees, tree identification, gum farming, forest fire prevention and protection and principles of timber management are sufficiently stressed by lectures and field demonstrations so that the boys carry home with them at least a basic knowledge of what forestry is all about. One of the by-products striven for in this work is that the boys will instruct other members of their families in protection of trees from fire and other hazards. That a certain number of these boys will become imbued with the idea of becoming forest farmers or will go on to take instruction in State ranger schools or in forestry schools is a natural expectation, though nothing is done to urge that they do so.

In Florida each chapter of the Future Farmers of America may send two boys to the annual camp for a week each. These boys are chosen on the basis of their forestry projects on home farms or in school work. In addition to instruction, a program of recreational activities is a feature of the camp.

Pictured Below

Left—Boys are shown the importance of scale stick to a forester in estimating the volume of lumber in any tree. Right—Demonstrations of fire-fighting methods are an important part of the teaching. One boy leads off with a back-pack pump to cool the fire down a little, while others approach with flaps to beat out the encroaching fire. In the background a shovel, rake and axe brigade complete the mopping-up operations.



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VICKERY DOCTORS

Each one of these Vickery Doctor designs, illustrated at the left, is needed to assure the finest job of doctoring under all kinds of service conditions.

Unequalled experience in the engineering and application of Doctors is back of every Vickery Doctor installation.

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASS.

PEOPLE

WILBUR McFEELY has been appointed director of industrial relations for both Riegel Paper Corp. and Riegel Textile Corp. Mr. McFeely has been serving as assistant director since 1945, and replaces GERRET R. SCHENCK who is retiring in line with the companies' retirement program.

HOBART V. HODGE was elected to the office of vice-president for Sales at the August meeting of River Raisin Paper Co. Mr. Hodge has held the office of general sales manager since January 1, 1951, and has been with the company since 1930. A. W. SCHULTE has been appointed to the office of general sales manager, with headquarters at the home office at Monroe, Mich. Mr. Schulte has been Manager of the company's Cleveland plant since 1942 and has been connected with the company since 1936. For the present Mr. Schulte will continue as Manager of the Cleveland plant.

A. R. CAPUTO, formerly assistant sales manager, has been named to head the expanded sales department at The American Box Co., 1900 W. 3rd St., Cleveland, Ohio.

WARREN B. BECKLER was appointed vice-president of Brown Corp. in charge of manufacturing.

TAYLOR D. WARD, director of advertising and sales promotion for Kimberly-Clark Corp., Neenah, Wis, has resigned, effective November 1, to establish his own business. He joined the company in 1942 as a division sales manager.

TAYLOR D. WARD, director of advertising and sales promotion for Kimberly-Clark Corp, has resigned effective November 1st. He plans to establish a business of his own, probably in paper wholesaling.

Ward began with Kimberly-Clark in 1942 as a division sales manager and shortly thereafter was placed in charge of advertising activities. Before joining the corporatiton, he had been active in the wholesale paper business in Chicago for a decade. He later established and managed a middle western sales office for Cherry River Pulp and Paper Co. and was sales manager for the Brownville Board Co. in New York. Mr. Ward has been in Neenah, Wis. for the last sixteen years, coming here as sales manager for the Bergstrom Paper Co.

THOMAS B. DONAHUE has been named executive assistant to the Southern retail divisional sales manager in Atlanta for Scott Paper Co. Mr. Donahue was Philadelphia industrial district sales manager at the time of his appointment.

WALTER A. KOEHLER has been named sales manager of the Milwaukee Lace Paper Co.

In his new capacity, Koehler will direct sales of all of the company's lines of paper specialties and supervise the company's nationwide sales staff and the sales activities of the company's West Coast Plant at Santa Clara, Calif.

GLENN W. MCPHERSON has been appointed as assistant to W. C. Koerner, vice-president and managing director, Alaska Pine & Cellulose Ltd., Vancouver, B. C. Mr. McPherson was previously manager of the Vancouver investment office of Great-West Life Assurance Co., having held this post for the past two and a half years.

Munitions Board Coordinates Standards, Packaging Units

The Munitions Board has streamlined its supply management program by coordinating the activities of the Packaging, Inspection, and Standards Agencies under administrative control of a newly chartered single unit, "Standards Agency."

The centralizing of administrative control is considered one of the most important advancement in the field of material standardization in the government in the past thirty years.

It is contemplated that it will eliminate many administrative and jurisdictional delays and materially increase production of specifications and standards.

St. Joe Expansion Underway

JACKSONVILLE, Fla. — The St. Joe Paper Co. has announced plans for its plant expansion at Port St. Joe, Fla., which will approximately triple present capacity instead of doubling it, as at first contemplated. The $25 million program will raise daily capacity from 400 tons to about 1200 tons, or about the same as the capacity of the International Paper Co.'s plant at Panama City, now the largest in the state.

Orders have already been placed for equipment and will include:

220-inch trim Pusey & Jones Fourdrinier, designed for 2000 fpm and 700 tons of paperboard per 24 hours; equipped with GE drive.

Two Combustion 300-ton recovery boilers.

Two B&W 200,000 lb/hr power boilers, 650 psi, 850 F.

Two GE turbines, of 12,500 KW capacity.

Two A-C lime kilns, 9 by 175 feet.

Sutherland refiners and pressure washing system.

Shartle broke beater.

Two Carthage chippers, 196-inch, 10-knife.

Six digesters.

Dorr causticizing system.

Roger L. Main, president of the company, said that the Tidewater Construction Co. of Norfolk, Va., which has the contract for most of the new construction, has started work which is expected to be completed by September, 1952. The Austin Co. of Houston, Tex., has been awarded a contract for a $700,000 box plant building. Engineering work for the new plant was done by Cummins & Barnard, Inc., of Ann Arbor, Mich.

Harry H. Saunders, plant manager, said the enlarged plant will utilize the brown stock refining process which was described in *Paper Trade Journal* of April 6, 1951, pages 24-26. A part of the expansion program is the modernization of all existing equipment, which, with the brown stock refining process, is expected to give the present plant an increase of about 100 tons a day over its rated capacity of 400 tons.

R. C. Brent Jr., manager of the company's woodlands division, has stated that in the first year of operation of the brown stock refining process the company produced more board than ever before and used less wood. The company now owns about 760,000 acres of woodlands within 100 miles of Port St. Joe and is attempting to bring all of the acreage into full production by modern forest management methods and reforestation. The company will also draw some plupwood from the Apalachicola National Forest of 560,000 acres which its lands adjoin, and will also draw some pulpwood from southeast Alabama and southwest Georgia. The company will plant about 4,000,000 trees this year and expect eventually to be growing as much timber as it uses.

GOVERNMENT GOSPEL

Construction Priorities

Where delivery of controlled materials after September 30, 1951, is required in amounts greater than those specified in Schedule I of CMP Regulation 6, a prime contractor may not commence or continue construction without receiving an authorized construction schedule and a related allotment of controlled materials. The application for the authorized construction schedule and the related allotment must be filed on Form CMP-4C. In processing these applications, each application will be considered separately on the basis of facts presented. In general the following criteria will be used as the basis of determination of whether or not an authorized construction schedule and related allotment should be granted or denied.

(1) A Class I priority for allotments of controlled materials will be given to steel, aluminum and aircraft expansion and similar projects.

(2) All industrial construction and plant expansion following the issuance of certificates of necessity construction of which has been commenced prior to August 3 will receive a Class II priority for allotments of controlled materials.

(3) Industrial construction and plant expansion pursuant to certificates of necessity issued after August 3, or where the issuance of the certificate of necessity was prior to August 3 but the construction had not commenced until after August 3, will receive a Class III priority for allotments of controlled materials.

(4) All other industrial construction will receive a Class IV priority for allotments of controlled materials.

If the quantity for controlled materials for plant expansion and industrial construction is not adequate to meet the requirements of all industrial construction demands, then the test of relative need and essentiality must be applied. In such instance, the recommendations of the claimant or sponsoring agency or industry division of NPA must be obtained and its recommendations screened to determine which particular construction can be deferred.

In the application of the above, the following should be considered:

(a) The effect upon the defense program if controlled materials for construction for plant expansion are not made available.

(b) The effect upon the civilian economy if items of plant expansion are not so fostered by delivery of construction materials.

Boxboard and Containerboard Pricing

Subcommittees of the Boxboard Industry Advisory Committee and Containerboard Industry Advisory Committee at a joint meeting with OPS officials made detailed recommendations on provisions of a proposed tailored regulation for their industry.

The proposed regulation would spell out dollars and cents ceiling prices on key grades and weights of boxboard and containerboard and specify differentials to be employed in pricing other weights and grades and also variations in finish, color, trim, packaging and volume of sales.

Ceilings on converting services would be determined by the spread between ceilings on raw materials and ceilings for the finished products.

It was proposed that ceilings be spelled out on standard grades of the following:

Boxboard — Plain chip, news vat lined chip, filled news, solid news, white vat lined chip, chip tube and can stock, single manila lined chip, single jute lined chip, mist gray lined chip, bleached manila lined chip, semi-binding and creasing chip, binding chip and white patent coated news.

Containerboard — Fourdrinier kraft linerboard, cylinder kraft linerboard, jute linerboard, bogus corrugating material, strawboard corrugating material and semi-chemical corrugating material.

Boxboard is paperboard used mainly in the manufacture of set-up or folding boxes, and containerboard is mainly used in the manufacture of corrugated or solid fibre containers.

The subcommittee members recommended that ceiling prices be established at approximately the level of prices prevailing under the General Ceiling Price Regulation.

They said that the prices suggested were roughly comparable to the prices that would be arrived at if computed under the Capehart amendment.

The meeting was opened by N. M. Brisbois, head of the Paperboard and Board Products Section, and conducted by John J. Brossard, industrial consultant for paperboard and converted products.

Gum Rosin and Turpentine, Exports

The OPS has issued Amendment 1 to CPR 52, which covers gum rosin and gum turpentine, clarifying the language of the Regulation which places export sales and sales for export of these products under Ceiling Price Regulation 61, the Export Regulation. CPR 52 was issued on June 27 prior to the issuance of CPR 61, and merely stated that such sales would be subject to a future "ceiling price regulation covering exports." The new amendment merely alters the language of CPR 52 to refer specifically to CPR 61.

Fibre Box IAC

Detailed recommendations on the provisions of a proposed tailored regulation for their industry were made August 28 by members of the Fibre Box Industry Advisory Committee at their second meeting with OPS officials.

Under the proposed regulation, which would apply to set-up and folding paper and fibre boxes and a variety of converted items such as drums, cones, tubes, bobbins and cores, manufacturers would determine their ceiling prices either on the basis of price lists or formulas employed during a specific basis period.

If the price by formula, manufacturers would compute their raw materials, converting and delivery costs, and apply the same margins as employed in the base period, which might be either a percentage or dollars and cents margin per unit.

Committeemen recommended that January 25 to February 24, 1951, be employed as the base period.

Folding Paper Box IAC

Detailed recommendations for the provisions of a proposed tailored regulation for their industry were made August 29 by members of the Folding Paper Box Industry Advisory Committee at their second meeting with OPS officials.

Under the proposed regulation manufacturers who price according to price lists would employ as their ceilings their prices in effect during a specified base period.

Manufacturers who price by formula would employ the formulas they used during the base period and apply the base period margins to costs of materials, conversion and delivery.

Committeemen unanimously recommended that the interval from January 25 to February 24, 1951, be employed as the base period.

They recommended that for non-integrated converters material costs under the formula should be the prevailing ceiling prices as fixed by other OPS regulations.

They said it would be impractical to determine material costs on the basis of delivery costs because frequently there would be changes between the time of estimating and manufacturing an order. A manufacturer would be forced to make numerous small changes from his estimated prices to avoid being in violation.

There was considerable discussion of the transfer price for materials used by integrated manufacturers — those who make both paperboard and paperboard boxes. For those who transfer their paperboard between the two operations at market prices, it was

suggested their transfer price be at existing ceiling prices. For those who transfer at cost, it was recommended the transfer price used in the base period be the transfer price under the formula.

Propose CPR22 Revision

Director of Price Stabilization, Michael V. DiSalle, told the manufacturers the agency was making necessary changes in the manufacturing regulation to conform with recent changes in the Defense Production Act of 1950.

"We realize," Mr. DiSalle said, "that controls create problems for business. We don't want to make them any more difficult than they necessarily are.

"Every word of the proposed revision is tentative. We don't feel that we have found satisfactory answers for all problems. We do not know how soon we can get this new regulation out, but we won't issue it until we are certain it fulfills the intent of Congress in amending the law and is as workable as we can possibly make it."

Under the tentative draft discussed at the meeting, manufacturers would have the option of retaining prices already calculated under CPR 22, or of recalculating ceilings and coming under the revised manufacturing order.

While the tentative draft follows the same general approach of CPR 22 for handling labor and material cost changes, it makes the various revisions required by the law, such as a different base period than in CPR 22, a later cut-off date for figuring cost changes, and provisions for reflecting overhead cost changes. CPR 22 specifically excluded increases in overhead expenses.

Some favored the present approach of the agency of allowing manufacturers the option of retaining their present CPR 22 ceilings or coming under the revised version, but suggested a modification of the revised regulation.

The current draft provides that if a manufacturer prices one commodity under CPR 22 it must price all commodities under that regulation. A number of the manufacturers suggested that the option be extended to different products of "optional divisions." Thus, for example, a manufacturer might use CPR 22 for chemicals and the revised regulation for cameras.

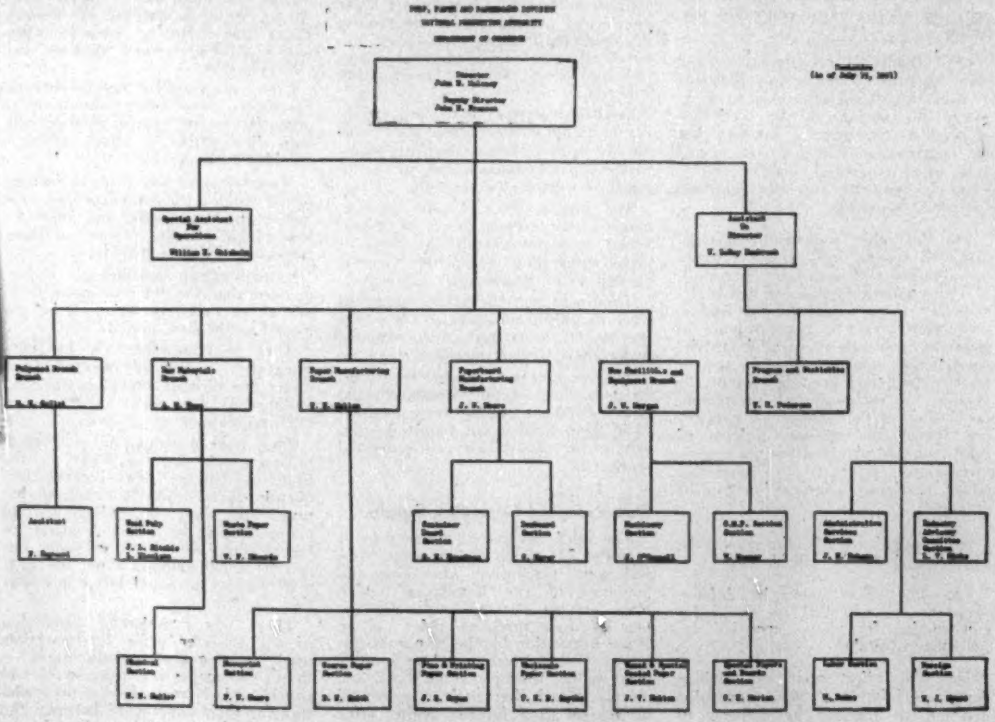
Other manufacturers suggested the agency drop consideration of a revised manufacturers' order, even though for optional use, and merely amend the present CPR 22 to incorporate the changes required by the recently amended law. Those who favored optional use of the revised CPR 22 opposed amending the present regulation, contending it would force manufacturers to recalculate ceilings even though they were satisfied with CPR 22.

They maintained that so long as manufacturers had the right to come under the revised CPR 22 at some later date their right to a higher ceiling, under the provisions of the new law, was protected.

Another group of manufacturers urged that they be allowed to remain under the General Ceiling Price Regulation of January 26, with the right to make individual application for higher ceilings under the new provisions of the law.

Some objection was raised to the provisions of the tentative draft for handling overhead costs. The current draft would require manufacturers, who chose to exercise the option of using it, to take full account of changes in volume of production or sales since the pre-Korean base period of January 1, 1950, to June 24, 1950.

Thus, for instance, if a manufacturer's volume had risen sharply since pre-Korea he might be forced to reduce prices because unit overhead costs were down.



Note: G. J. Ticoulet, formerly Director is now Deputy Assistant Administrator Chemical, Rubber and Forest Products Bureau.

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Covington Modernizes

E. P. McGinn

Industrial Editor, Paper Trade Journal

Construction of the original mill of the West Virginia Pulp and Paper Company, at Covington, Va., was completed in 1900. At that time the company had mills in operation at Luke, Md., and Tyrone, Pa.

The original installation consisted of a sulphite pulp mill and a paper mill, and was located on the west side of the Jackson River. The sulphite mill consisted of three digesters having a total daily production of 75 tons of pulp. The paper mill contained two Fourdriniers having wire widths of 120 inches and 132 inches.

In 1921 a soda pulp mill was built on the East side of the river and a short distance upstream from the first mill. This installation contained six digesters, eight diffusers, two four-effect evaporators, and five rotary black ash furnaces.

In 1931 six digesters were installed in the West mill for additional production of soda pulp.

A five stage bleaching plant, designed to produce 150 tons per day of fully bleached pulp, was installed in 1939. A duplicate of this plant was installed in 1947, and the production capacity of both units was stepped up to a possible 550 tons per day with continuous operation, actual production of bleached pulps is 400-500 tons per day.

In 1939 the sulfite pulp mill was permanently shut down.

In 1942 the mill installed a semi-chemical pulp mill containing two chemipulpers and in 1940 a semi-chemical unit in which the wood was cooked at atmospheric pressure.

Prior to World War 2 most of the mill production went into publication papers, but during the war some of the hardwood soda pulp production was changed to kraft by the addition of sulfur to the cooking liquor and later by the use of salt cake for chemical makeup instead of soda ash. At the same time part of the production of book papers was replaced with stronger grades such as milk bottle and cup stock, tag, folder, file divider, bond envelope, as well as some unbleached grades such as liner board and kraft wrapping. Of course, the semi-chemical pulp was used for the manufacture of 9 point corrugating board.

In 1946, there were two separate woodyards, one on each side of the river. At that time about 1¼ million dollars was spent to build the Dry Run woodyard for pine on the east side of the river. Three barking drums were installed in the new woodyard. At first barked logs for use in the West mill were trucked over to the old chipper house at the West Mill. A new chipper and an additional barking drum were then installed at the East mill in May 1951 and chips for the West Mill trucked across the river. This method is still in use, and will be until consolidation of the pulp mills has been completed.

In 1947, the design capacity of the filter plant was increased from 12 to 24 million gallons per day. At present this plant is actually producing 30-35 million gallons per day.

In 1950, it was decided to consolidate the four separate pulp mills into a single installation on the east side of the river. This new mill was designed to produce three separate kinds of pulp as follows: 150 tons per day of hardwood semi-chemical pulp; 200 tons per day of hardwood sulfate pulp and 250 tons per day of pine sulfate pulp. The bleach plant has sufficient capacity to bleach all of the pine and hardwood sulphate pulp.

One of the first steps in the consolidation was the construction of a new woodyard for handling hardwood. A little less than a million dollars was spent to install a modern woodyard for handling hardwood, alongside the new Dry Run pine yard. This new system went into operation in May, 1951.

Wood Supply

The mill requires about 850 cords of wood per day, most of which is supplied by small independent producers. All of the wood is delivered in five foot lengths.

A large percentage of the hardwood is brought to the mill in trucks, but most of the pine is delivered in railroad cars by the Chesapeake and Ohio Railroad. For many years only box cars were used for transporting the wood, but the C&O has now adopted a rack car with a longitudinal depressed center well that allows the sticks to be carried safely in double rows across the car. The use of rack cars greatly reduces the handling costs.

The new woodyard places the mill's capacity for handling hardwood on a par with its pine handling facilities, which have been operating at the Dry Run Wood Yard since 1947. The new hardwood layout replaced a makeshift operation that had been set up temporarily until a new system could be worked out.

New facilities of the hardwood yard include a mile of new roadway, laid out in a double loop; a flume about a quarter of a mile long, which conveys hardwood unloaded from trucks and storage piles to the barking drums.

Part of the wood coming to the yard each day is sent directly to the barking drums and thence to the chipper. The balance of the wood is delivered to the crane for storage in the yard. Wood for immediate use is delivered to one of the flumes in which it is carried to the inclined chain conveyors and thence to the barking drums. The flume for handling hardwood is about ¼ mile long, three feet wide, and three feet deep. Water flows through the sluiceway at a speed of about four miles per hour. It parallels the hardwood storage piles on the east side of the yard. This flume is steel and has a fairly steep pitch and high water velocity to keep the heavy submerged hardwood sticks moving. It is fed by a pump capable of circulating about 14,000 gallons of water per minute. It is capable of conveying about 800 cords of wood to the barking drums in a 24-hour period.

Water from the low end is passed through a Chain-Belt travelling wire screen and pumped through a return pipe line to the high end of the flume.

The new hardwood yard, combined with the up-to-date pine yard with its wood bridge and sluice system, gives the Covington plant one of the most modern wood-handling systems of any paper mill in the country. All the equipment in both yards is operated electrically by master controls from a high tower which gives the operator a sweeping view of all operations. Plans have been laid for many progressive features, including the instal-

food for thought...

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1. Fires caused by careless smokers...	19.8%
2. Fires caused by careless debris	18.7%
3. Fires caused by careless campers...	4.7%
4. Fires caused by incendiaries	30.3%
5. Fires caused by lightning.....	9.3%
6. Miscellaneous causes.....	17.2%

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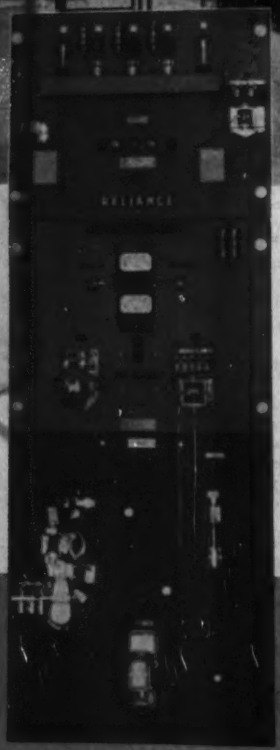

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Figure 1—Front part of pine wood stacker over large pile of pine pulpwood. Hardwood storage may be seen at left. Figure 2—Part of pine wood stacker. New digesters to be installed in pulp mill are shown in foreground. Figure 3—Hardwood flume in foreground. Woodyard control center and barking drums in background. Figure 4—Pine wood flume at right with return waterway at left. Figure 5—Inlet side of barking drum structure showing bark conveyors. Figure 6—Jack ladder conveyors carrying hardwood, left and pine, right up to barking drums.

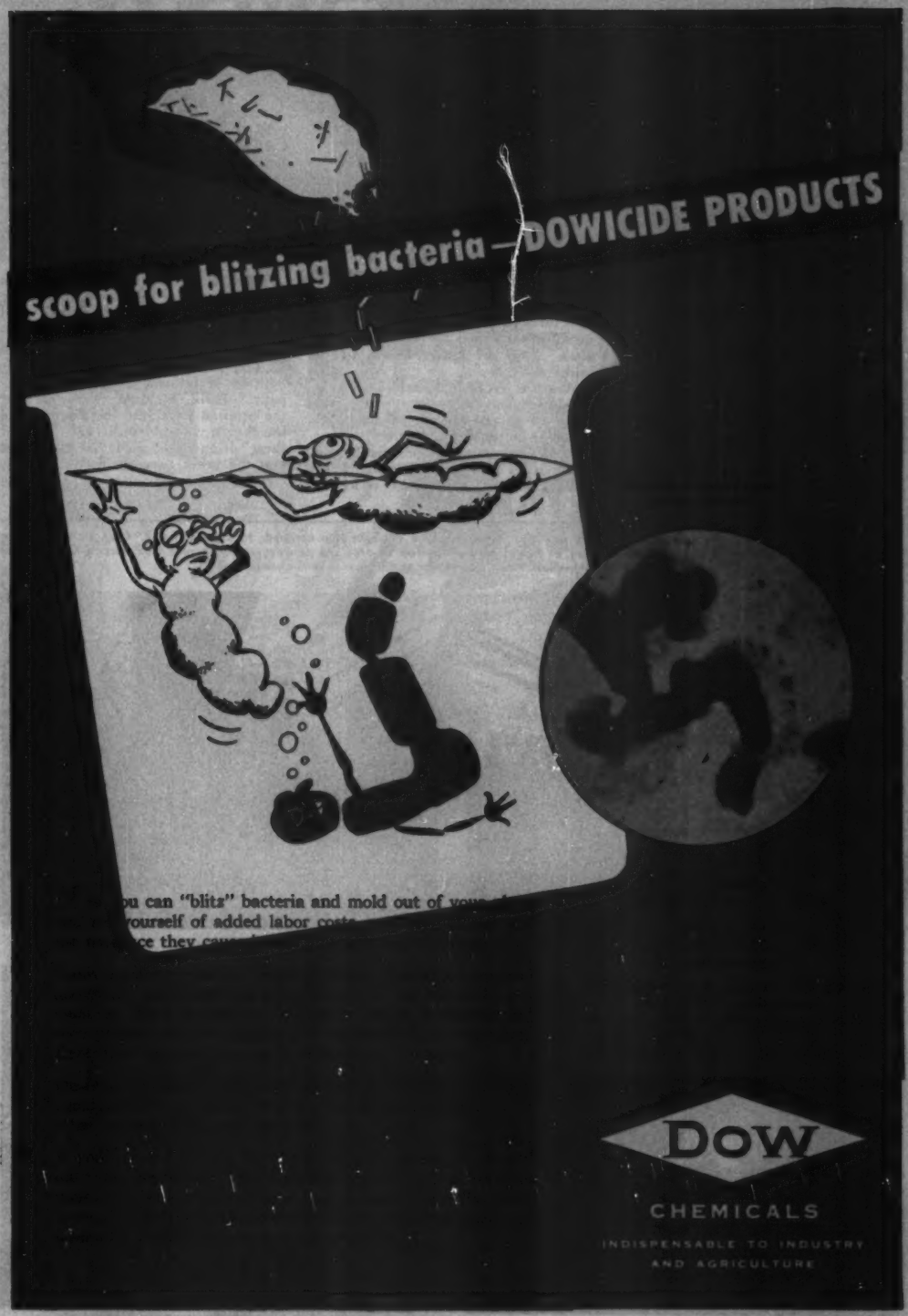
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Figure 7—Travelling screen filter for water in hardwood flume.

lation of banks of lights throughout the yard to facilitate night operations.

The pine flume is made of concrete and is about ten feet wide and three feet deep. It is also about ¼ mile long, the length of the woodyard now in use. A similar flume carries the water back to the far end by gravity, where it is then pumped up to the high end to provide the head for both sections.

The pine stacker is a bridge type structure 900 ft. long and 80 ft. high. Wood is carried up an inclined cable conveyor and then along the level part of the bridge to the point at which it is desired to stack the wood. The structure is designed to allow openings for the wood to be made at any place along the entire length of the bridge.

Wood is reclaimed and sent to the barking drums by means of a cable conveyor at the bottom of the stack. Wood from the stack may also be carried by the same flume that brings wood from the railroad cars to the barking drums. This flume is located between the railroad siding and the storage stack.

The hardwood storage yard which is located alongside the pine yard, is provided with an inclined conveyor type of stacker fitted to move along a railroad siding. A truck road along the railroad siding and flume allows the wood to be unloaded to the stacks directly from trucks or railroad cars. The flume between the storage stacks carries the wood to an inclined conveyor that takes it to the barking drums.

Wood is transferred from the stack to the flume by means of a crawler crane equipped with an orange peel grapple.

There are four barking drums, each 12 feet in diameter and 45 feet long, built by Manitowoc Engineering Company. Three of these were part of the original woodyard installation, and the fourth was added in 1951. Two of these drums are used for hardwood and the other two are used for pine.

The most revolutionary piece of

Figure 8—Outlet end of barking drums. Pine drums on left. Figure 9—Pine sulphate chip conveyor to digester house. Chip storage bins in background, pine at left, one of two hardwood bins at right. Figure 10—Top of drag link conveyor carrying pile from sorting house to the chipper. Figure 11—Robbins chip conveyor and tripper in semi-chemical mill.

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Figure 12—View of two types of pulpwood conveyors. Left drag link carrying pine, right new 825 ft. rubber belt conveyor. Figure 13—Closeup view of hardwood chip storage bins. Figure 14—Digesters under construction.

new equipment installed at this stage is a new rubber belt conveyor, 825 feet long, which will move peeled hardwood logs from the barking drums to the chip house. A prime illustration of the speed of mechanical changes in modern industry, the new equipment is a distinct departure from the pinewood conveyod line, a conventional drag chain type, installed only a few years ago.

The new conveyor, which parallels the older pine conveyor, is a continuous belt of rubber, looped over a series of steel rollers and powered by a 40-horsepower motor. The belt is 1700 feet long, spliced in one place, three feet wide, about a half-inch thick, and weighs about five tons. Lower maintenance costs, plus more efficient operation are advantages which engineers hope to gain from this new type conveyor.

Pine from the barking drums falls into a flume which carries it to an inclined chain conveyor and thence to the chipperhouse. There are two 10 knife 96" Carthage chippers each directly connected to a Westinghouse synchronous motor. One chipper is used for hardwood, the other for pine. The chips from each system are carried up separately by bucket elevators to chip screens on the floor above. Hardwood chips are screened on two Rotex inclined vibrating screens and the pine chips are screened on a pair of Tyler inclined vibrating units.

Undersized material from the chip screens is added to bark from the barking drums and carried by truck to an inclined conveyor outside the boiler house. The bark is put through a hammermill before being sent to the boiler. Oversize chips are put through hammermills before being returned to the systems for rescreening. Accepted chips are carried by bucket elevators to the new all steel chip storage bins. There are four of these bins, two each for the hardwood and pine systems. Each bin has three cone bottoms, each cone being equipped with a Rex Chain-belt rotary feeder.

The new bins are equipped with intricate conveyor belt and elevator systems which will deliver chips to the digesters and semi-chemical cookers. About 700 feet of conveyor belts and three elevators are included in the delivery system, which will be operated automatically from control panels in the pulp mill. The bins have sufficient capacity to give the mill a 15-hour supply of chips, which is about triple the storage space of the old system.

When the new pulp mill is completed the two chip systems (pine and hardwood) will branch out into three systems, as follows: pine chips for sulphate cooking; hardwood chips for sulphate cooking and hardwood chips for semi-chemical. At present only part of the pine system and part of the semi-chemical system are in operation, all of the hardwood sulphate and part of the pine sulphate and semi-chemical are still being made across the river in the West Mill.

When the system has been completed, chips for each of the three systems will pass over Merrick Weightometers (one for each system) and will then pass over the top of the digesters on a three-foot wide, rubber conveyor belt. Robbins Trippers, (one for each system), that may be moved above the particular digester to be loaded, shunt the chips from the conveyor into a loading hopper leading to the digester opening.

In the East Mill, at present, there are six old digesters, each having a capacity of 2580 cubic feet, now in operation cooking pine sulphate. In an extension of the digester building, four new Blaw Knox digesters, each 11½ feet in diameter by 50 feet high and each having a volume of 4000 cubic feet, have been installed, but are not yet in operation. As soon as these four have been placed in operation the six old digesters will be removed, one at a time, and replaced with six others, identical in size to the first four new ones. When all 10 of the new digesters are in operation, the six old digesters in the West Mill will be taken out of service. Each of the latter digesters has a volume of 3750 cubic feet. Thus, the ten new digesters, having a total volume of 40,000 cubic feet, will be ample replacement for six digesters of 2580 cubic feet and six of 3750 cubic feet making a total of 37,980 cubic feet.

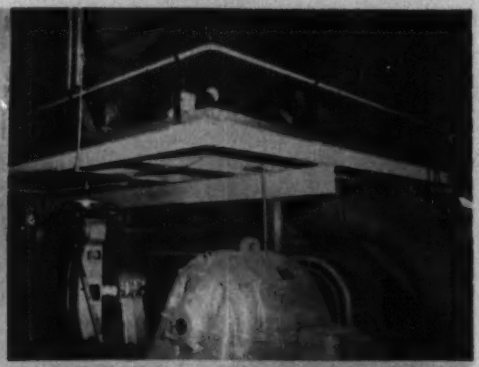
The nominal capacity of the 10 new digesters will be 450 tons per day. The digesters may be divided between hardwood and pine systems in the ratio of 5 and 5, 6 and 4, or 4 and 6, since both hardwood and pine washing and screening systems are each designed to handle 300 tons per day, and the chip handling systems have plenty of capacity to handle these variations.

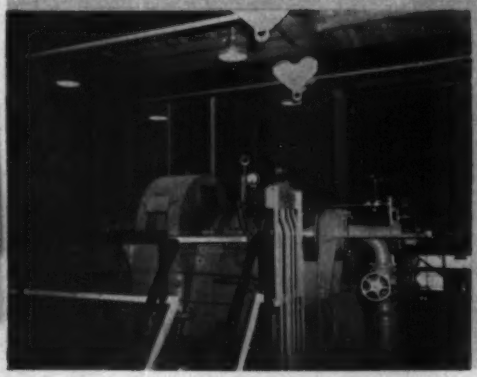
The new digesters are equipped with Esco strainers and circulation systems, with Morris 1600 GPM circulating pumps driven by 30 horsepower Continental motors. Circulating liquor may be admitted to the top or bottom of the digester, or both, and is removed through a strainer ring two-thirds of the way up.

The old digester building which was 26 feet wide by 94 feet long was extended 58 feet, making a total length of 152 feet to accommodate the extra digesters.

Each digester is equipped with a Fairbanks-Morse Sphero primary blow valve operated by a Philadelphia Gear Works Limitorque remote control unit. Each digester also has a gate type Fairbanks-Morse Auxiliary Blow valve also operated by a *Limitorque*. Both valves are operated from the control panel on the digester operating floor.

The digesters are being insulated by Reid-Hayden Company with Johns-





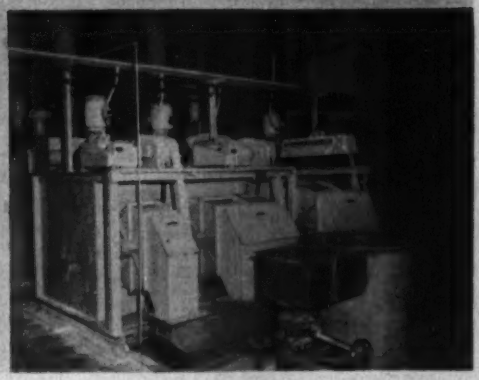


Figure 15—Blow heat recovery unit at left with the three new blow tanks to the right. Figure 16—Messing-Durkee semi-chemical pulp mill. Figure 17—One of two chemi-pulper units in semi-chemical pulp mill. Figure 18—A view of some of the Impco vacuum washers in the bleaching plant. Figure 19—Installation of two Sutherland 48 inch hot stock refiners on semi-chemical pulp. Figure 20—The stock regulating and proportioning system on No. 5 paper machine.

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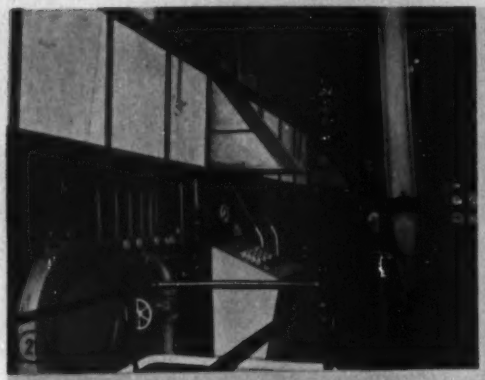
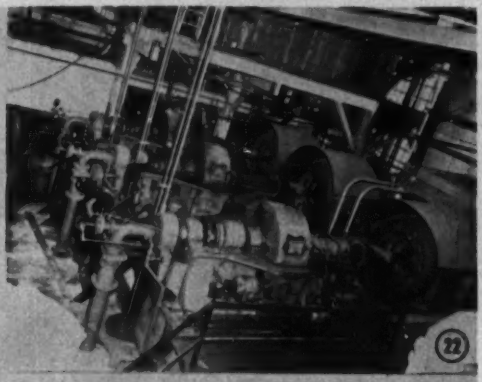
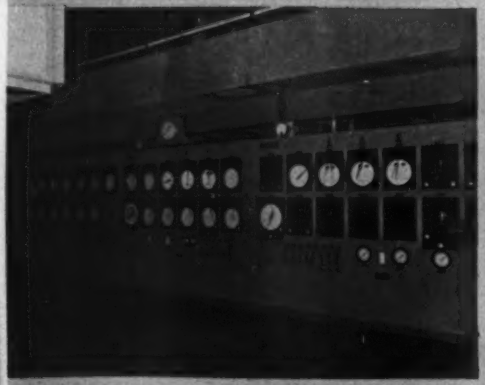
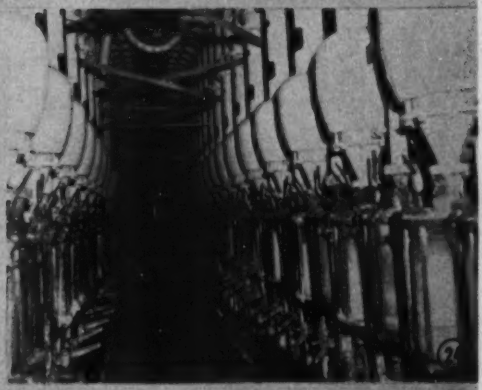
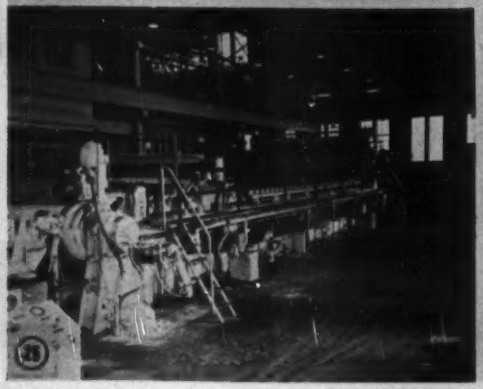
Figure 21—Three stage Impco pine sulphate washer. Figure 22—An overhead view of the three Sutherland Refiners used for preparation of the stock on No. 5 paper machine. Figure 23—Panel board for three washer systems in washer room. Figure 24—A view of the installation of 70 Dirtees on No. 5 paper machine. Figure 25—The rebuilt Fourdrinier section on No. 5 paper machine. Figure 26—View of No. 5 paper machine from the dry end.

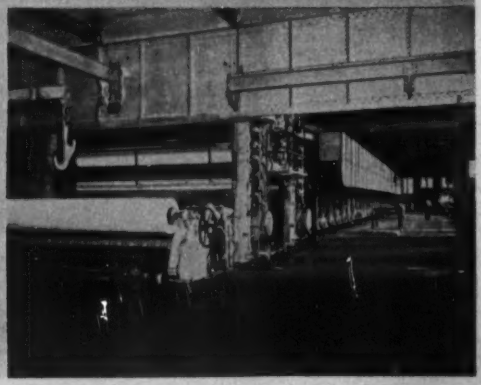












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The new semi-chemical mill contains at present, one Messing-Durkee continuous semi-chemical pulping unit and one chemi-pulper continuous semi-chemical unit which was moved from the West Mill. Another chemi-pulper unit now operating in the West Mill, is scheduled to be moved to the new mill within the next few weeks.

The present total production of all semi-chemical units is 130 tons per day, the present limit of number 6 paper machine which uses all of the S-C production for 9 point corrugating. This machine is scheduled for rebuilding within the next several months. At that time the productive capacity will be increased. When completed, the semi-chemical pulp mill will have a rated capacity of 150 tons per day.

The Messing-Durkee semi-chemical unit consists essentially of a rotary valve feeder which feeds the chips and cooking liquor into a reaction chamber consisting of a large loop of a 2-foot diameter pipe, followed by an asplund defibrator.

Each chemi-pulper unit consists of a six tube reaction chamber, with tubes 18 inches in diameter, followed by an asplund defibrator.

Neutral Sodium Sulphite is used for cooking all of the semi-chemical pulp.

Pulp from the semi-chemical units in the new mill is discharged into the New S-C blow tank which is identical with the two other units, to be used for hardwood Sulphate and Pine Sulphate respectively. Each unit has a cone bottom equipped with an Impco torque controlled agitator type consistency regulator. Each blow tank has a diameter of 24 feet, a straight side height of 25 feet, a cone height of 25 feet, and a capacity of 90,000 lbs. of stock at 12 percent consistency. All three tanks are connected to a Foster Wheeler blow heat recovery system equipped with a jet condenser.

Washing

Stocks from the hardwood sulphate and pine sulphate and semi-chemical blow tanks are each pumped to their respective lines of vacuum washers in the washer room on the top floor of the new pulp mill building that also houses the semi-chemical plant, the washer filtrate tanks, and high density storage tanks.

Stock from the bottom of the semi-chemical blow tank, regulated to 3½ percent consistency, is pumped up and through the two 48 inch Sutherland hot stock refiners, arranged in parallel. The refiners are located on a mezzanine above the washer room. Refined stock flows by gravity to the first stage of the semi-chemical washing system.

There are eight Impco vacuum washers in the three washing systems. Each cylinder is 11½ feet in diameter by 16 feet long. The three-stage pine sulphate and hardwood sulphate systems form the outside row in the washer room with the two-stage semi-chemical system in the center, in front of the common control panel board. The pine sulphate and hardwood sulphate systems each have a four unit Impco vibrating knotter immediately preceding the first washer stage. The semi-chemical system does not require a knotter, since the stock is hot refined before washing.

The washers are driven by 20 horsepower Reliance, D.C. variable speed motors.

Each washer has its own seal tank and each system has a foam breaker. Concentrated liquor from the first stage of all three systems is combined and sent to a Waco filter and thence to the evaporators.

Stock from the final stage of each washing system drops into its respective high density storage tank. These three tanks, which are located in the new pulp mill building underneath the last stages of each washing system, are each 21 feet in diameter by 22 feet straight side height and have cone bottoms equipped with agitators. Each tank has a capacity of 54 tons of stock at 16 percent consistency.

Four more high density pulp storage tanks for screened stock will be built at the West Mill (next to the bleach plant). Each of these tanks will be 35 feet in diameter by 40 feet inside height and will have a capacity of 100 tons at 11 percent consistency.

Above each of these high density tanks there will be an Impco 6½ feet by 14 feet valveless vacuum decker to thicken the incoming stock to the required consistency before discharging it into the tank.

From the high density storage the semi-chemical pulp is diluted to pumping consistency and pumped to number six paper machine.

Screening

At present there is an unbleached pulp screen room in the East Mill and one in the West Mill. Each is equipped with 10 lines of primary screens and one line of tailing screens.

When the pulp mill consolidation is complete, a new screening system, in the East Mill will handle both pine and hardwood sulphate pulps. This system will contain 10 Bird Vibroter screens, 6 Impco flat screens, two rotary thickeners, and one new Impco 6½ feet by 14 feet valveless vacuum decker.

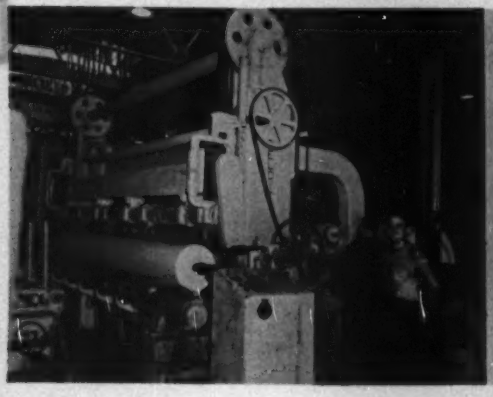
Screened stock will be stored in the new high density stock chests, two for pine and two for hardwood.

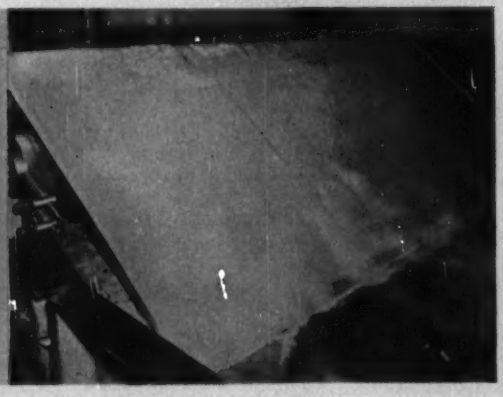
Bleaching System

There are two identical continuous five stage bleaching systems, each having a possible maximum capacity of 275 tons per day, which is sufficient to handle the full production of both pine and hardwood pulp.

Each system contains a Hooker chlorinator in which the pulp is blended with chlorine gas as it flows downward in a mixing chamber, then

Figure 27—New Beloit slitter winder at the end of No. 5 paper machine. Figure 28—Waco filter used for black liquor filtration.





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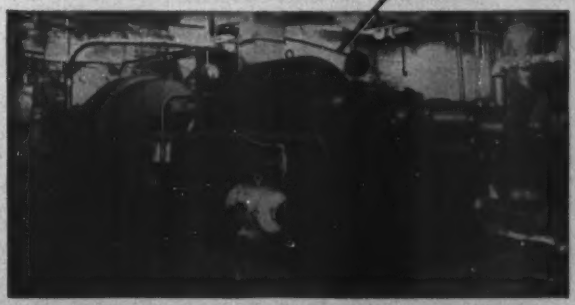

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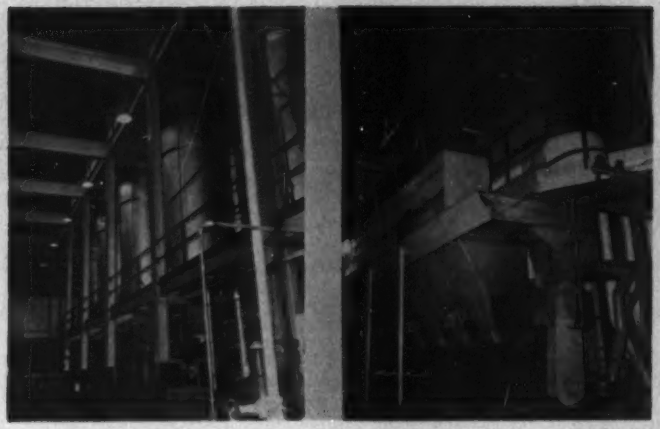

Figure 29—Swenson six effect evaporator system. Figure 30—Foster Wheeler boiler equipped with Detroit Rotograte stoker.

upward in a small tower, then into the chlorinating tower where it flows down a center draft tube and up the outside where it overflows to the first stage acid washer. This first stage is under pump pressure. In the succeeding stages the stock is pumped from the bottom of one stage to the vacuum washer from which it flows by gravity through the next stage. In each of the bleaching cells the pulp flows downward through a small diameter tower which provides the head for the stock to flow upward in a large diameter tower whose top is a few feet lower than that of the small tower.

The second stage is a hypochlorite bleach on the acid side, the third stage is a caustic extraction. The fourth and fifth stages are identical alkaline hypochlorite bleaches. Each of the latter two stages consist of three bleaching cells in series as compared to one cell each for the second and third stages. Each of the five stages is followed by an Impco, 8 feet by 10 feet, vacuum washer. Pulp consistency in all stages is maintained at 4-5 percent.

Bleached pulp from the two systems flows to bleached stock storage chests from where it is pumped to the screen room. The bleached stock screening system contains 14 lines of flat screens, 12 of which are primary and two tailing. Screened stock is thickened on four deckers. This screen room, at present, has sufficient capacity for only one of the two bleaching systems. Additional screens will soon be added to provide sufficient capacity for screening the pulp from both bleaching systems.

Paper Mill

The paper mill at present contains seven Fourdriniers, one of which, No. 5, has just been rebuilt. Machines 6 and 7 are scheduled to be rebuilt within the next few months. A new 216 inch machine is now on order with Beloit Iron Works for delivery next year. It will be necessary to remove machines 3 and 4, to provide room for the installation of number 8. Machines 1 and 2 will be kept in operation until 6 and 7 have been rebuilt and 8 has been installed, and then they will be placed in standby service.

Thus it is planned to concentrate the paper production in four high production machines, and remove from operation, four inefficient low production machines.

Number 5 paper machine, which was originally built by Rice Barton Co. in 1925, was rebuilt about one year ago by Rice Barton and Beloit Iron Works. Rebuilding job included a new headbox, a new and larger Fourdrinier part with quick wire changing device; several new dryers; a new Westinghouse turbine and cone pulley drive; and a new winder at the end of the machine.

This machine is now equipped with a Beloit headbox and removable Fourdrinier containing 34 table rolls, eight flat suction boxes and a suction couch.

The press section includes a Rice Barton dual suction press and a smoothing press. This machine has a wire width of 214 inches and a normal trim of 192 inches. Maximum speed is 1200 feet per minute.

There are now 44 five foot diameter rolls in the dryer section, an increase of 17. The machine is also equipped with a breaker stack, a size press and two calender stacks.

The new Beloit winder is located at the end of the machine. None of the other paper machines at Covington are equipped with winders. In the past, the reels have been sent to the finishing room for slitting and rewinding. However, as the machines are rebuilt they will be equipped with winders.

A new Ross hood and ventilating system provides not only a substantial increase in the heat efficiency of this machine but also greatly improves the comfort and working conditions in the machine room.

The Westinghouse drive turbine operates on steam at 150 PSI, producing 900 H.P.

The stock preparation system on number 5 paper machine includes a slush stock metering system for proportioning three kinds of stock to the machine system. The slush stocks used are, bleached pine sulphate, bleached hardwood sulphate and machine broke. This metering system consists of three DeZurik consistency regulators, one for each type of stock, and a Trimbey three stock proportioning system.

Proportioned stock flows to the Trimbey No. 1 standpipe, thence by pump to tiled lined beater chest.

From this point the stock is pumped through (3) three, 42" Sutherland Refiners; going from this point to the No. 2 standpipe.

From No. 2 standpipe the required amount of stock goes through four line jordans which are in series, thence to machine chest. From the machine chest the refined pulp is pumped through to the final refiner or tickler Jordans and then to the machine regulating headbox. The stock is then diluted with white water and pumped through a battery of 70 Dirtecs before going to the fan pump and the paper machine headbox.

Machines 6 and 7 both have 170 inch wires and both trim about 150 inches. Number 6 runs entirely on 9 point corrugating at a present production rate of 150 tons per day.

Number 7 machine averages 120-135 tons per day on white grades such as cup stock, file folder, etc.

Stock preparation equipment for these machines includes a new Trimbey four stock regulating and proportioning system for number 6 with a three stock system soon to be installed on number 7. These systems like that on number 5 include a DeZurik consistency regulator for each type of stock and Trimbey proportioners that meter each type of stock in the desired amount. Link-Belt PIV units provide speed regulation for the stock meters.

The four types of stocks on number 6 are semi-chemical, unbleached kraft, broke and screenings.

The machine and beater chests on No. 6 and 7 machines are being rebuilt with propellor type agitators and tile lined. Number 7 machine has two Sutherland refiners and number 6 has three. In addition No. 6 machine has five Jones jordans and two Noble and Wood jordans, and No. 7 machine has six Noble and Wood jordans as ticklers.

When these machines are rebuilt, there will be a complete re-arrangement of the stock preparation equipment.

A substantial addition to the building at the dry end of machines six and seven is nearing completion. The new part which extends out a few feet over the edge of the river, will provide space for a winder at the end of each machine.

Paper machines one and two have wire widths of 120 and 132 inches, trimming 105 and 115 inches respectively. Machines three and four have wire widths of 136 and 148 inches trimming 119 and 128 inches respectively.

There are 17 jordans and one 42 inch Sutherland refiner available for use on the stock for these machines. This equipment will also be rearranged for use on machines six, seven or eight. Four new 48-inch Sutherland refiners are now in the beater room awaiting installation for use on number eight machine.

The large finishing room located at the dry ends of machines one, two, three, four and five contains six rewinders, eight cutter layboys and six supercalenders in widths varying from 72 to 158 inches. This equipment will also be rearranged.

White Water Recovery

With a situation such as that at Covington where a large pulp and paper mill is located on a small river, the problem of stream pollution becomes very important. This has become especially true in the past few years because of the constantly increasing stringency of the regulations being imposed by both Federal and State Governments.

The reduction in wastes discharged to the river has been an important consideration in all of the improvements recently made at the mill.

For example, the change from diffusers to vacuum washing provides a substantial reduction in the amount of weak black liquor discharged to the river.

A reduction in the amount of waste going to the river from the paper mill is expected by the substitution of Waco filters for the settling tanks now in use for white water clarification.

There are twelve of these wooden tanks, each 12 feet diameter by 15 feet high. The white water is admitted near the center of the tank at a slow rate. The solids are supposed to separate out and flow to the bottom where they are constantly removed. The clear water is laundered from the top.

Several years ago, when a high percentage of the product of this mill was book or publication papers containing large amounts of fillers, these settling tanks were fairly efficient. Most of the mineral fillers used in book paper settle quite readily and usually carry large amounts of fiber to the bottom. However, the presently made grades of paper use very little filler and the fiber has about as much tendency to float as to sink. In fact, fiber from the corrugating grade on number six machine definitely tends to float rather than sink. This fiber is recovered from the top surface.

The thickened slurry from the above tanks flows to four small eight ft. diameter by 12 ft. high concrete tanks from where it is pumped to the DeZurik consistency regulators and to the paper machine regulators to be used for dilution. The clarified water is pumped to a well in the beater room from where it is drawn for showers, etc. This water is also used in the pulp mill. The use of Waco filters should provide a positive separation of stock from the white water and thus allow the clarified water to be used for many purposes for which it is now unsuitable.

Recovery System

As previously mentioned in the description of pulp washing, liquor from the first stage of each washing system is passed through a Waco filter to remove fibers, fines and other undissolved solids.

The Waco filter is essentially a machine that continuously forms its own filter mat on a Fourdrinier wire from papermaking fiber. The liquid to be filtered is continually passed through this filter mat. The speed of rotation of the cylinder around which the Fourdrinier wire and filter mat is suspended is supposed to be just sufficient to provide new filtering surface at the same rate as it is being filled up by solids from the liquid being filtered.

The speed of rotation of the Waco filter used for black liquor filtration is so slow that its movement is barely discernible.

The filtered liquor is pumped to a storage tank from which it is then sent to the evaporators. At present there are two, six body, six effect Swenson evaporators with a third unit soon to be added.

Between the third and second effects of the evaporators the liquor is sent to a skimming tank where the tall oil soap floats to the top and is skimmed off.

Heavy black liquor from the evaporators is pumped to a storage tank from where it is pumped to small mixing tank used for adding Glaubers salt, when it is used. The liquor then goes to the eight cascade evaporators, after which it passes through another small mixing tank where salt cake and salts recovered from the Koppers precipitator are added. The liquor then goes to the 19 rotary furnaces. All of these furnaces are 24 feet long with six being 11 feet in diameter and the other 13 being nine feet in diameter. All are equipped for gas firing.

This is the point at which the Covington mill differs from almost all other sulphate mills. Most mills burn the liquor in spray type recovery furnaces equipped with boilers to make use of the heat generated in burning liquor. The reason why this method is not used at Covington is that, many years ago when the mill was a soda mill, a process was developed, and a plant built to produce activated carbon from leached black ash carbon. It

Figure 31—View of construction work on lime kiln and causticizing system. Figure 32—General view of generator room.

Figure 33 — View of No. 13, 12,500 KW generator.

is sufficiently profitable to continue operation of the rotary furnaces.

Black ash from the furnaces goes to the Dorr leaching cells. Here all of the soluble salts are dissolved into a weak liquor which becomes green liquor and goes to the Dorr slaker and thence through the regular Dorr continuous causticizing system. This new system is still under construction as is the Traylor Lime Kiln 350 ft. long by 11 ft. diameter. When this new kiln is in operation the three old kilns now presently operating will be taken out of service.

Boiler Plant

Since the recovery system uses rotary furnaces from which little heat is obtained, most of the steam in this mill must be obtained from other forms of fuel. Because of its proximity to the Appalachian coal fields, coal is the logical fuel for this mill.

The total steam requirements here average 750,00 lbs. per hour in the summer and 800,000 lbs. per hour in the winter. This is provided by three large boilers, the newest of which is a Foster Wheeler unit equipped with a Detroit Rotograte Stoker and having a capacity of 300,000 lbs. of steam per hour at 600 PSI, 700°F. This boiler is designed to use either or both bark and coal. Bark is brought over from the drums by truck and carried up to the boiler by a conveyor.

The other two units are Riley boilers equipped to burn pulverized coal. Each of these boilers is rated at 300,000 lbs. of steam per hour at 600 PSI, 700°F.

In addition to the above, there are four Edgmoor boilers, each rated at 100,000 lbs. per hour, 400 PSI, 600°F. These are in standby service.

Electric Power

This mill operates entirely on 25 cycle A.C. electric power. It was built before the present standard frequency of 60 cycles A.C. was generally accepted and electrical equipment was practically custom made. With the now accepted standard frequency being 60 cycles there are some disadvantages in the use of an off-standard frequency. However, in a self-contained unit such as the Covington Mill these disadvantages are of minor importance. The principal disadvantage is that a slightly longer time may be required to obtain new electrical equipment or parts but this is easily overcome by carrying a more complete stock of spare equipment and parts. The other disadvantage of this frequency is the necessity to include reduction gear units in the turbo-generators.

There are eight turbo-generators in this mill, six of which are in active service with two standby units. A new 12,500 KVA Westinghouse unit is scheduled for installation in June 1952. The new machine will be similar to the other two newest Westinghouse units now in operation, numbers 12 and 13. Number 12 was installed in 1940 and number 13 in 1947. Each uses steam at 600 PSI.

A built-in reduction gear reduces the 3600 RPM of the turbine to 1500 RPM in the generator. Each has a rated capacity of 12,500 KVA at 6600 volts, 25 cycle three phase A.C.

All of the turbines except the standby units, numbers 10 and 11 are equipped to extract at either 150, 45, and 32 PSI and exhaust either to the 32 lb. system or the condensers. However, load conditions determine the use of the extractions and condensers on each turbine.

Another Westinghouse machine, number nine, also uses steam at 600 PSI. The reduction gear reduces the 3600 RPM speed of the turbine to 750 RPM in the generator, which produces 7500 KW., 480 volt, 25 cycle, 3 phase A.C.

There are three General Electric turbo-generators, numbers six, seven and eight. The turbines of these machines are similar to each other except that six and eight take steam at 400 PSI and number seven takes steam at 600 PSI. All have reduction gears that reduce the 3600 RPM turbine speeds to 500 RPM in the generators. The generators of six and seven each produce 5000 KVA at 480 volts 25 cycle, 3 phase A.C. Number eight generator produces 5000 KVA at 6600 volts, 25 cycle, 3 phase A.C.

The standby units numbers 10 and 11 are identical Westinghouse machines. These units are not equipped with reduction gears so the turbines operate at 1500 RPM which makes them very inefficient. They use steam at 150 PSI. Each of the generators produce 3500 KW at 440 volts, 25 cycle, 3 phase A.C.

Electric power is distributed at 6600 volts to substations located in various parts of the mill, transformers reduce the voltage at the substations to 440 for further distribution.

Many of the large motors in the mill take the full 6600 volts provided by three of the generators. Other motors are operated on 440 volts.

Experimental Pulp Laboratory

An experimental pulping laboratory, fitted with the most modern equipment for laboratory and pilot plant production of pulp by all processes is in operation at Covington. This laboratory has developed a method for production of dissolving pulp from hardwoods by the sulphate process. This process is projected for ultimate commercial application at the West Virginia mill in Charleston, S. C.

Program Continuation

When the present program of construction has been completed the Covington mill will be one of the most modern sulphate pulp and paper mills in the United States.

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Semi-Chemical Continuous Cooker, Messing & Durkee.
Rebuilding #5 Paper Machine, Building #8 Paper Machine to be completed next year. Beloit Iron Works.
Dual Press on #5 Machine, Rice Barton.
Several Consistency Regulators, DeZurik Co.
Several Pulp Proportioning Systems, Trimbey Co.
Drive Turbine #5 Paper Machine, 1200 KW, Turbo Generators, Electric Motors, Westinghouse Co.
48 Inch Refiners in Semi-Chemical Mill and Paper Mill, Sutherland Refiner Corp.
8 11½ x 16 Pulp Washers, 3 Waco Filters Improved Paper Machinery Co.
Various Types of Sizes of Electric Motors, Continental Electric Motor Co.
Tile Lining for Chests, Stebbins Engineering Co.
Barking Drums, Manitowoc Engineering Co.
Conveyor Belts, Goodyear Co.
Rex Chipping Feeders and Conveyors, Chain Belt Co.
Travelling Screen Filters and Two 10 Inch Knife Chippers, Carthage Machine Co.
Two Rotex Chip Screens, Orville Simpson Co.
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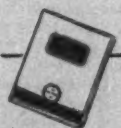

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FREEPORT'S GOOD NEWS

Discovery of a large new deposit of sulphur which is expected to be a major factor in solving the current world shortage of this essential mineral was announced August 22 by Freeport Sulphur Co.

To develop the deposit, located at the mouth of the Mississippi River, Freeport will build a $10 million-$15 million mining plant having a production goal of 500,000 long tons of sulphur a year.

The mine, the largest single sulphur development anywhere in the world in nearly 20 years, is expected to be ready for operation in 1953.

This development comes after many years spent by Freeport in searching for new reserves of sulphur throughout the Gulf Coast region and in a number of foreign lands.

In commenting on this exploration program in their annual reports last March, it was mentioned that current exploratory drilling plans included four new prospects, at some of which indications of sulphur had been found in preliminary drilling. It is at one of these prospects, known as Garden Island Bay, that the existence of a large deposit of sulphur has now been established.

Engineering studies have not been completed, but it is estimated that the plant will cost between $10,000,000 and $15,000,000. The ultimate amount will depend upon thermal efficiency, quality of the sulphur, and special difficulties encountered.

It is expected to complete the construction in two years, provided the necessary action is taken by government agencies with respect to materials and other phases of the project.

Garden Island Bay is located in the marches of the lower Mississippi River delta 100 miles southeast of New Orleans. The deposit is native sulphur, or brimstone, which is the cheapest and purest of the various forms of the element. The sulphur occurs in a typical salt dome formation.

The dome was discovered by the Texas Co. in exporing for oil, which is being produced from the flanks of the formation. Freeport obtained the sulphur rights early in 1951 and under its lease will pay the Texas Co. 50 per cent of the profits derived from the operation.

Additional C/N

WASHINGTON, D. C. — Expansion of three wood pulp producing facilities, and a number of paper or related products' output were approved by Defense Production Administration just prior to the 90 days' moratorium on certificates of necessity on August 18, it was disclosed this week by the defense agency.

A list of 109 certificates of necessity for accelerated tax amortization processed just before the moratorium included the following:

Brown Co., Berlin, N.H., wood pulp, $1,318,075 certified, 65 percent allowed.

Penobscot Chemical Fibre Co., Old Town, Maine, wood pulp, $817,717 certified, 65 percent approved.

Fitchburg Paper Co., Fitchburg, Mass., wood pulp, $208,049 certified; 65 percent allowed.

Roanoke Rapids Paper Co., Inc., Roanoke Rapids, N. C., waste paper, 100 tons of paper box board, $2,600,855 certified, 50 percent approved.

Combined Locks Paper Co., Combined Locks, Wis., pulp fibre, book paper, $369,765 certified, 65 percent approved.

Pacific Paperboard Co., Long View, Wash., $993,950 certified, 50 percent approved.

Paulsboro Mfg. Co., Fullerton, Pa., kraft liner, $42,538.

Buckeye Cellulose Co., Taylor County, Fla., prehydrolized sulphate pulp, $21,527,000.

Grant Photo Products, Cleveland, Ohio, waterproof paper, $93,300.

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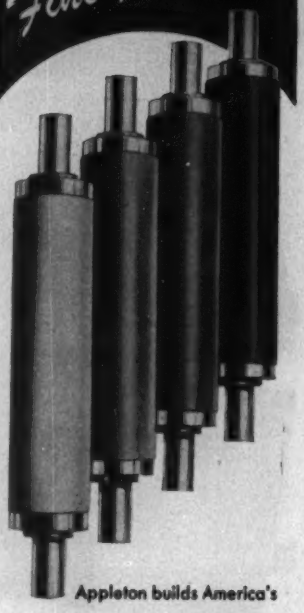

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Charleston Improvements

E. P. McGinn

Industrial Editor, Paper Trade Journal

Although it has an abundance of salt water and even has a couple of rivers flowing by it, the city of Charleston, S. C., had for many years prior to 1937 been short of fresh water.

In the early thirties, a Charleston engineer conceived the idea of constructing an underground tunnel through the bed of marl, from the Edisto River, 22 miles west of the city to Charleston. This tunnel would be about 60 feet below the surface and sloped to carry water by gravity to a pumping station near Charleston.

The idea appeared very favorable to the city officials but they could not raise sufficient capital to carry out the project until, in 1936, the management of the West Virginia Pulp and Paper Company agreed to build a kraft pulp and paper mill north of the city and contracted to purchase a substantial portion of the water to be provided by the tunnel.

The project was completed by the time the new kraft mill was ready for operation in 1937. The tunnel ran from the Edisto River to a pumping station about four miles northwest of the mill, called "Goose Creek Pumping Station." From here the water is pumped to the city and to the mill. At present the mill is using about 32 million gallons per day and the city is taking about 28 m.g.d.

When the Charleston mill went into operation in 1937 it was one of the largest kraft mills in the United States.

The mill is located on the Cooper River about ten miles north of Charleston. The mill has its own dock for receiving barge shipments of pulpwood or other raw materials. The mill is served by three railroads: the Southern, Atlantic Coast Line, and Seaboard Airline.

Wood Handling

Wood is carried from the yard to the barking drums in chain conveyors which are fed by crawler cranes with orange peel grapples, by crawler cranes with "rake" attachments, and by hand.

There are two D. J. Murray and one Manitowac barking drums, each 12 feet in diameter by 45 feet long. The wood from the barking drums is carried directly by conveyor up to the chipper house, where it is fed into the two D. J. Murray chippers. These machines are comparatively new, having been in operation about one year. Each chipper has a 10 knife disc, 110 inches in diameter. Each is directly connected to a General Electric 800 hp., 277 r.p.m., synchronous motor.

Chips are carried by a conveyor up to the four vibrating chip screens, two of which are Tyler and two Rotex. Oversize chips are reduced in a rechipper. The bark is carried by conveyor to two bark burning boilers and converted into steam.

Accepted chips are carried up a long belt conveyor to the chip bins above the digesters.

There are, at present, nine digesters, with a tenth to be added within a few months. Each digester has a volume of about 4000 cu. ft. and holds 17 cords of wood in chip form. Each cook yields about 14 tons of pulp, with the total daily average production being about 840 tons.

The mill is equipped with 10 wash pans, some of which are still in use while the vacuum washing system is being completed. There are also three new blow tanks, each holding 3½ blows (45 tons of stock). Steam from the blow tanks is sent to a blow heat recovery system.

Two-thirds of the new vacuum washing system is now in operation, with one more three stage system still under construction. Each of the Impco three stage systems consists of three separate vacuum washers, each having a cylinder 11½ feet diameter by 16 feet long. Each washing system is equipped with its own Brown instrumentation and control system. The washers are driven by variable speed d.c. drives.

Each washer is equipped with a Ross hood and ventilating system to remove steam and other vapors from the washers and the washer room.

The vacuum washer operating floor, as well as the tops of the wash pans, are immediately adjacent to the digester operating floor with no wall between.

Each washer has its own large horizontally cylindrical filtrate tank on the ground floor of the pulp mill building, adjacent to the digesters. Three vertically cylindrical foam tanks, equipped with Impco foam breakers, are located outside the pulp mill building.

Washed pulp flows to a storage chest from where it is pumped to rotary knotters and thence to the six rotary fine screens and eight lines of Impco flat screens.

Knotter rejects are put through four Bauer refiners and then returned to the system for rescreening.

Screened stock is thickened on three Impco deckers before being sent to nine large vertical cylindrical concrete stock chests where it is stored at 16 percent consistency.

Stock from these chests is pumped to the beater chests of machines one and two in the refiner room. There are 20 Sutherland refiners which are normally divided into 12 for number one machine and eight for number two machine. All of the refiners are arranged in parallel. That is, each portion of stock passes through only one refiner.

Number one machine is equipped with a secondary headbox and stock system to provide a better formed top surface. When the secondary headbox is in operation, eight refiners are used for the primary stock and four for the secondary.

Refined stock from each system passes into its respective machine chest, from where it goes to the machine regulator and thence to the fan pump.

Secondary stock goes to its own machine chest, regulating box and fan pump. This stock normally constitutes 15 to 20 percent the weight of the sheet.

The fan pump on number one machine has a capacity of 40,000 g.p.m. This is an Allis-Chalmers pump and it is driven by two Allis-Chalmers motors, one on either end of the pump shaft.

The fan pump on number two machine is driven by two General Electric motors but is somewhat smaller, having a capacity of 25,000 g.p.m.

Number One Machine

Number one machine, which was built by Pusey and Jones in 1937, primarily for the production of liner board, has been in operation since the mill started. It was partially rebuilt

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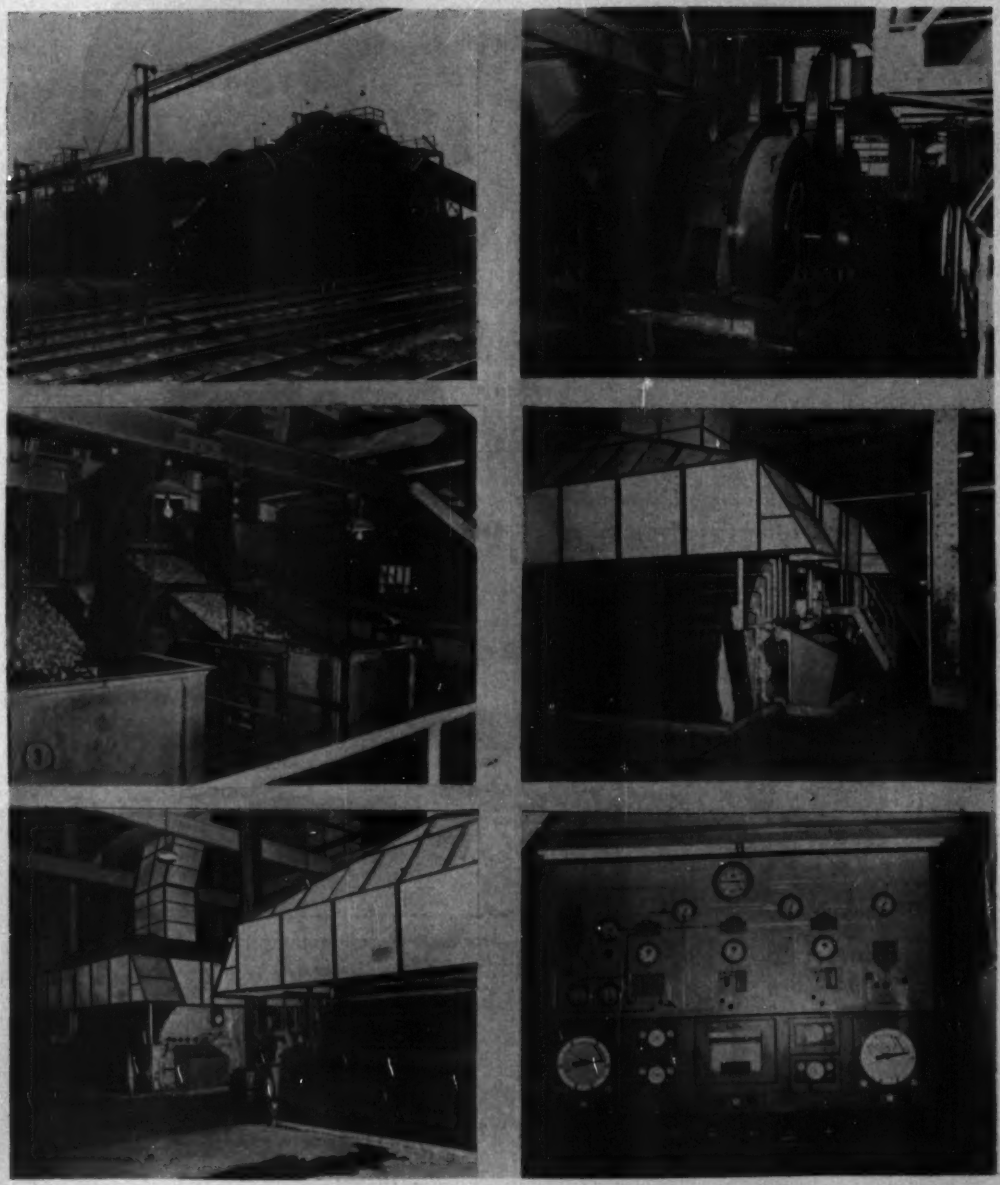
Figure 1—Battery of three barking drums. Figure 2—Pair of D. J. Murray 110 inch ten knife chippers. Figure 3—Three of the four chip screens. Figure 4—Full length view of Impco vacuum pulp washing system. Figure 5—First stages of two of the Impco three stage washing systems. Third system under construction at extreme left. All units are equipped with Ross hoods and ventilating systems. Figure 6—Brown Instrument Co. control and instrument panel for pulp washer.



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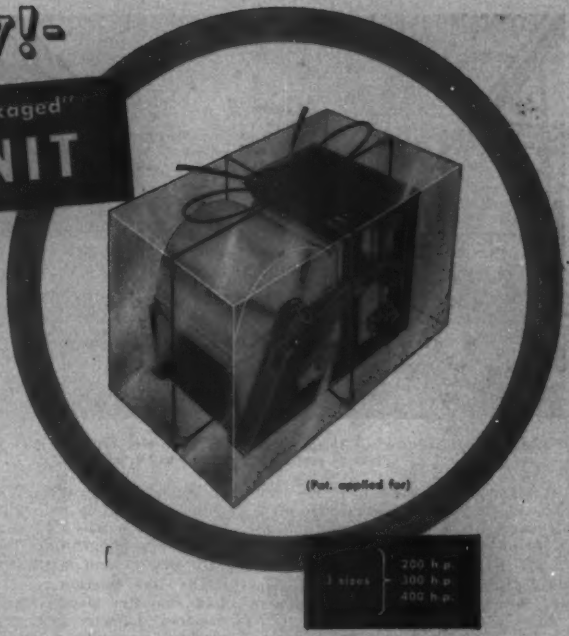

Yes! — a completely pre-assembled Beating Unit . . . that produces better quality, more uniformly refined fibre, at up to 65% savings in power over conventional beaters.

Features: lower installation cost (no assembly in the mill), simpler floor construction, less floor space, lower maintenance — PLUS more refining capacity, greater flexibility of operation, more positive treatment of stock, and no possibility of untreated stock passing through the Beating Unit.

Available for Multibeater (continuous operation) or tub installation. Ask your Jones representative for details.

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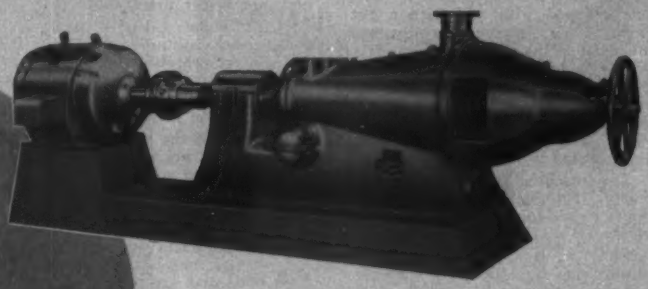
BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

Jones

BIG BROTHER



Nearly 700 Jones High-Speed Refiners had been sold* when we introduced the FIBREMASTER—a refiner especially designed and built for mills requiring the unique features of the smaller machine, but much higher capacity.

The FIBREMASTER is the "big brother" of the High-Speed Refiner . . . duplicates its improved stock control, its flexibility, operating and maintenance economy, its versatility — but with a capacity of at least twice the tonnage.

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**943 as of May 1, 1951*

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BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

Figure 7—Chip conveyor from chipper house to chip bins over digester. Figure 8—New blow tanks in center. Heat recovery unit at left.

by Beloit in 1950 and returned to service about a year ago with a new Fourdrinier part, a Beloit pressure headbox and other improvements.

The Fourdrinier has 26 table rolls, 10 flat suction boxes and a 54" diameter suction couch and carries a wire 246" wide by 140¼' long.

The press section contains four presses, three straight through suction presses and one smoothing press.

This machine has 82 five-foot paper dryers and 20 four-foot felt dryers, all equipped with anti-friction bearings. These dryers presently carry steam at 60 p.s.i. All of these dryers will soon be replaced with high pressure dryer rolls that will take steam up to 125 p.s.i. This will allow an increase in production on this machine since the present bottleneck is drying capacity.

This machine is equipped with two Farrel Birmingham calender stacks with 3 five-foot dryers between the stacks.

The reel is a Beloit unit and the slitter winder is a Cameron No. 20.

Each of the two machines is equipped with a new roll crane built by Industrial Crane Co. of Chicago. These cranes move on flanged wheels set in floor tracks parallel to the machine sole plates. The crane itself is supported in a bridge across the top of the two side frames that are carried on the tracks.

Number one machine is driven by a Westinghouse sectional electric drive.

Number Two Machine

Number two machine was built by Beloit and placed in operation in 1947. This machine was designed to produce lighter weights than number one and is used mostly for bag, wrapping and kraft specialties.

This machine has a Beloit pressure headbox similar to that of number one and installed about the same time. The Fourdrinier is a Beloit removable type with quick change wire. It is equipped with 17 table rolls and eight flat boxes and carries a wire 246" wide by 121' long. The Fourdrinier is equipped with two suction couch rolls.

The dryer section contains 48 five-foot diameter paper dryers and 10 five-foot diameter felt dryers. This machine is equipped with a breaker stack after the first dryer section, and has a two rubber-covered roll size press after the second section. The top roll of this unit is driven by a Westinghouse helper drive motor.

There are two calender stacks, both Beloit open side units. The reel and the winder were both built by Beloit.

This machine is driven by a Westinghouse steam turbine through a line shaft and cone pulleys.

Controls for the various sections of each machine are located in consoles in the machine room aisle. The wet end controls and instruments for both machines are grouped together in a large three-side panel surrounding a stair well opposite the press sections.

Each machine is equipped with a Ross hood and ventilating system.

Recovery System

Liquor from the first stage washer filtrate tanks goes to the black liquor storage tanks, from where it is pumped to two six effect evaporators.

Between the third and fourth stages of evaporation the liquor is sent to the skimming tank where the tall oil soap floats to the top and is skimmed off. These skimmings are sent to the tall oil plant. The liquor is returned to the third stage of evaporation.

Heavy liquor from the evaporators is pumped to the recovery building where the recovered salts from the precipitators are added in a small mixing tank before the liquor enters the cascade evaporators. There are three of these cascade evaporators, a double unit on furnace five and single units on furnaces six and seven. Number four is not equipped with a cascade. On leaving the cascades the liquor passes through a mixing tank where the make-up salt cake is added before it is sprayed into the furnaces. All of the furnaces now in operation are B. & W. spray type units. Number seven is the newest, having been in operation about a year. Each of these four furnaces produce about 100,000 pounds of steam per hour at 585 p.s.i.

Number five furnace has an unusual installation, the first of its kind in the United States. It is called the Broman shot cleaning system and is used to keep the economizer clean. Steel shot about ⅛ - ¼ inches diameter are continually dropped down through the economizer tubes, collected at the bottom of the furnace, carried up through a four inch pipe by suction to a hopper at the top of the furnace where they again are sprayed down over the tubes.

The economizer tubes in this boiler are horizontal but the system is supposed to work with either horizontal or vertical tubes.

Number 5, 6, and 7 recovery furnaces are equipped with the usual I K Diamond automatic soot blowing system.

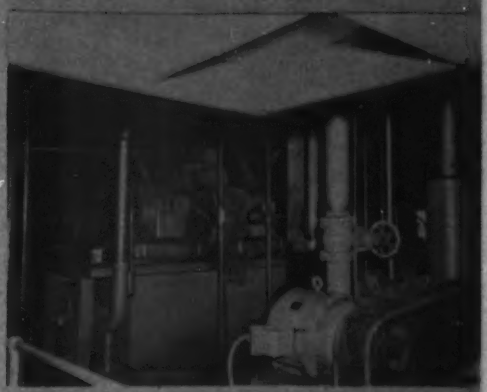
Gases from numbers 4, 5, and 7 recovery furnaces pass through a Research Corporation precipitator before going out a common stack. Gases from number six furnace pass through a Koppers precipitator before being discharged from the stack. The Koppers precipitator was installed in 1949.

A Dracco pneumatic salt cake handling system unloads the salt cake from box cars and sends it up to a storage silo above the mixing tank in the recovery furnace building. This silo holds 100 tons of salt cake. The Dracco system unloads a box car (50 tons of salt cake) in eight hours.

Smelt from the recovery furnaces drops into the enclosed dissolving tanks where it is dissolved in weak liquor from the lime mud washer. Green liquor from the dissolving tanks is pumped to the green liquor clarifiers, thence to the slaker and thence to the causticing tanks. From the causticizing tanks the liquor is pumped to the white liquor clarifier, the overflow from which goes to white liquor storage, with the underflow being pumped to the lime sludge washer. Sludge from the washer is then sent to the vacuum filters and Bird centrifuges from where it is carried by screw conveyors into the three lime kilns.

The two older kilns are Traylor units, 150 feet long by eight feet diameter. The new kiln which has been in operation a short time was built by F. L. Smidth Company and is 200 feet long by ten feet diameter. It is equipped with a gasoline engine auxiliary drive to avoid buckling of the kiln in event of a failure of the electric motor drive or power supply.

Figure 9—Battery of Impco flat screens. Figure 10—Battery of Impco rotary screens. Figure 11—A few of the 20 Sutherland Refiners that prepare stock for the two paper machines. Figure 12—Bauer refiners, used for disintegration of screen rejects. Figure 13—General view of No. 1 paper machine from dry end. Figure 14—Fan pump on No. 1 paper machine has capacity of 40,000 GPM.



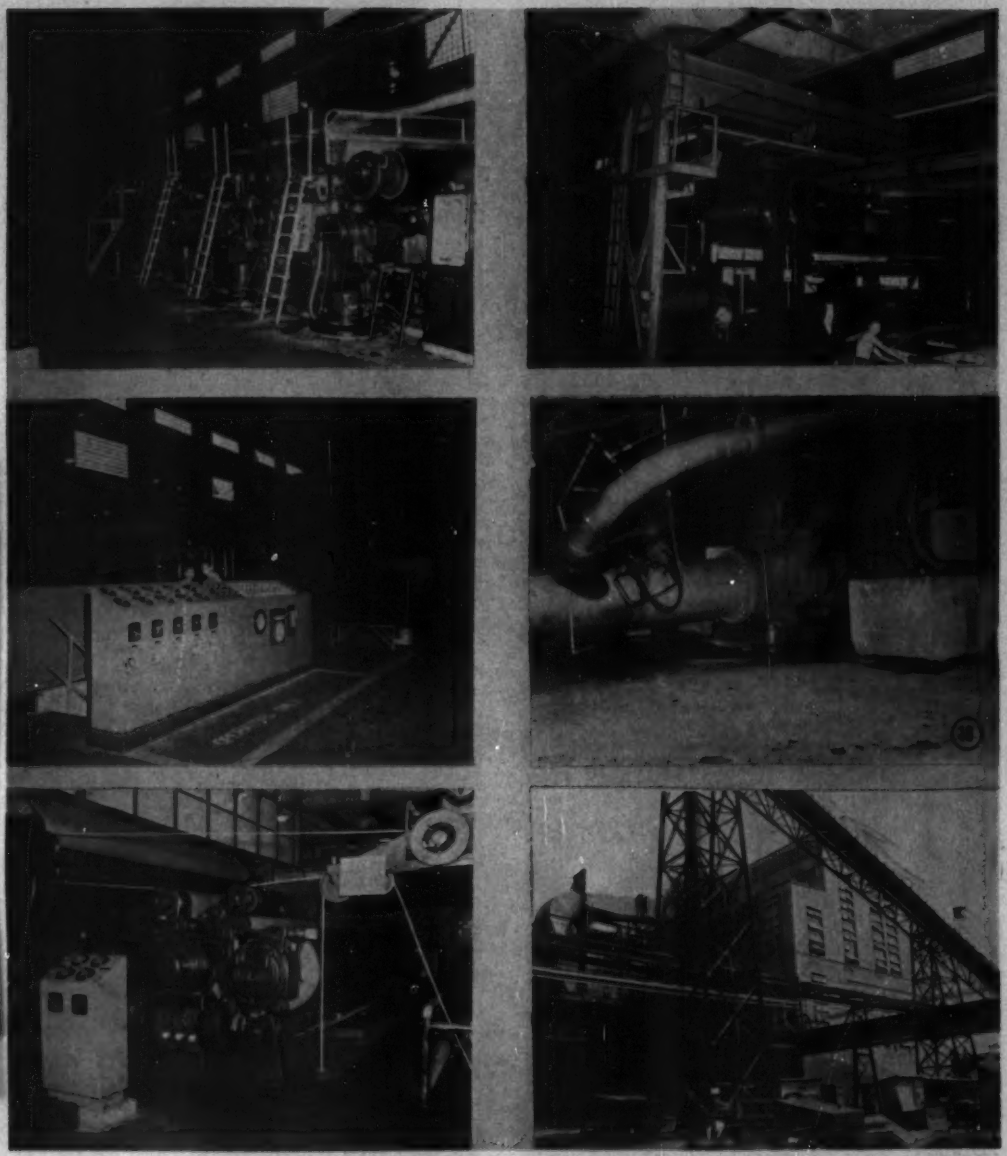


Figure 15—Press section and Fourdrinier of No. 1 paper machine. Figure 16—Reel, reel crane and slitter-winder on No. 1 paper machine. Figure 17—Control panel in foreground, Fourdrinier and headbox of No. 2 paper machine in background. Figure 18—Fan pump on No. 2 paper machine. Figure 19—Breaker stack on No. 2 paper machine. Figure 20—Recovery boiler building in background with chip conveyor rising up in foreground.

Figure 21—View of three lime kilns. Figure 22—New 200 ft. F. L. Smidth lime kiln. Figure 23—Coal storage silo. Figure 24—New Foster Wheeler power boiler with Detroit rotograte stoker. Figure 25—Instrument panel of new boiler. Figure 26—No. 7 B & W recovery boiler.

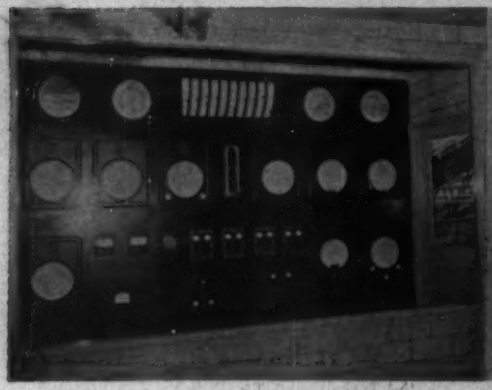


Figure 27—Instrument panel of No. 7 recovery boiler. Figure 28—New General Electric 12,000 KV turbo-generator.

Power Plant

In addition to the four recovery boilers there are two bark burning boilers and three coal fired power boilers.

The newest and largest of the boilers is a Foster Wheeler unit that was placed in operation in February 1951. This boiler is equipped with a Detroit Rotograte stoker and has a rating of 325,000 pounds of steam per hour at 600 p.s.i. 710°F. The present operating pressure is 580 p.s.i.

The two other coal fired boilers are both Riley units equipped for burning pulverized coal. Each of these boilers produces 225,000 pounds of steam per hour at 580 p.s.i. 710°F.

The two bark burning boilers are Babcock and Wilcox units. The smaller of the two produces 50,000 pounds of steam per hour at 580 p.s.i. 710°F. and the larger produces 90,000 pounds of steam per hour at 580 p.s.i. 710°F.

Electric Power

Electric power is produced by four turbo-generators having a total rated capacity of 34,000 kw.; all of the turbines operate at 3600 r.p.m. on steam at 580 p.s.i. 710°F.

Figure 29—Generator room showing four turbo-generators with newest and largest unit at the rear.

Figure 30—Tall oil treating plant. Figure 31—Part of Broman shot cleaning system for No. 8 recovery boiler economizer.

Number one turbine extracts at 150 p.s.i. and exhausts at 35 p.s.i. Its generator produces 6000 kw. at 2300 volts, 60 cycles, 3 phase a.c.

Number two turbine extracts at 35 and exhausts to a condenser. Its generator produces 6000 kw. at 2300 volts, 60 cycles, 3 phase a.c.

Number three turbine extracts at 65 and 35 p.s.i. and exhausts to a condenser. Its generator produces 10,000 kw. at 13,800 volts, 60 cycles, 3 phase a.c.

Number four turbine extracts at 150 and 65 p.s.i. and exhausts to a condenser. Its generator produces 12,000 kw. at 13,800 volts, 60 cycles, 3 phase a.c. Number four, the newest of the group, is a General Electric machine and has been in operation for 16 months.

to solve refining problems economically—

American Boxboard uses

Sprout-Waldron Refiners

Three Sprout-Waldron refiners are used by the American Boxboard Co. of Filer City, Michigan for pulping and refining semi-chemical chips for corrugating board pulp.

Here's why S-W Refiners are preferred by mills throughout the United States and Canada:

- Flexibility of operation
- High capacity
- High pulp quality
- Ease of feeding
- Low capital investment per ton of pulp
- Low maintenance costs
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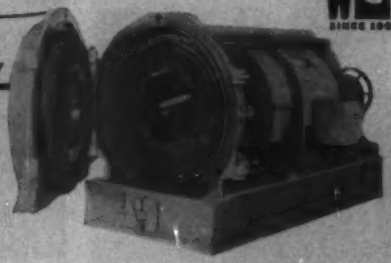
You can pinpoint exact pulp test requirements with the Sprout-Waldron Refiner.

√ List of Applications

√ Semi-chemical Pulping (Bleached-Unbleached)
√ Pre-Refining—High Yield hot brown stock
√ Kraft—Groundwood—Sulphite Knots & Screenings
√ Secondary Refining of Asplund Stock
√ Insulation Board Stock
√ Hardboard Stock
√ Flooring Felt
√ Special Applications

The Sprout-Waldron 36-2 Refiner is the foremost producer of semi-chemical pulp today



Send for your copies of Better Fibers, a factual file on successful semi-chemical pulping operations. Write Sprout-Waldron & Co., Inc., 59 Waldron St., Muncy, Pa.

Sprout-Waldron

Manufacturing Engineers

MUNCY, PENNSYLVANIA

Research and Development

The Research and Development Department of the company is located at the Charleston mill. Here work is done to develop new uses for intercellular matter and chemicals left over after cooking pulp.

Current work includes use applications and process studies for such products as Indulin (lignin from black liquor), Polycel (shredded pulp fibers) and Liqro, Indusoil, Rosoil, Tallene and Tallex (tall oil).

The department is equipped with the most modern laboratory and pilot plant facilities.

Tall Oil Plant

The tall oil plant receives soap skimmings not only from the Charleston mill, but also from several outside sources. More than 2,000 tons of skimmings per month are processed in the plant, about two-thirds of which come from Charleston.

Laminator

A laminating machine has recently been put into operation for the production of heavy weight board.

This machine consists of four Greene Line Rollmaster unwinder stands; two four-foot predriers; adhesive pick-up and transfer rolls; two plain presses; eight Black-Clawson four-foot dryers on a vertical frame; and a Moore and white winder. Starch adhesive is used for the lamination. The production of this machine is 60 tons per shift.

List of Suppliers

Power Boiler, Foster Wheeler Co.
Roto Grate Stoker, Detroit Stoker Co.
12,000 KW turbo generators, General Electric Co.
Recovery Boiler, Babcock & Wilcox Co.
Pneumatic Salt Cake, Unloading System, Dracco Co.
Flow Meters, Republic Co.
Water Level Indicator, Yarnall-Waring Co.
Steel Shock Cleaning System for Boiler Economizer.
Soot Floor Blowers, Diamond Co.
Two 10 Inch 10 Knife Chippers and Barking Drums, D. J. Murray Co.
Six 11½x16 Vacuum Washers, Three Foam Breakers, 11 Flat Screens, Improved Machinery Co.
Washer Control Instruments, Brown Instrument Co., Div. of Minneapolis-Honeywell Co.
Rebuilding Number one Machine Pressure Head Boxes Number one and Number 2 Machines, Beloit Iron Works.
Roll Cranes, Machines No. 1 and 2, Industrial Crane Co.
Sectional Drive Number 1 Paper Machine, Westinghouse Electric Co.
4 Breen Line Roll Master Roll Stands, Greene Co.
Instruments, Bristol Co.
Recovery Boiler Instruments, Bailey Meter Co.
Instruments, Republic Flow Meter Co.
Instruments, Foxboro Co.
Vacuum Pumps Number 1 Paper Machine, Roots Connorsville Co.
200 Ft. Lime Kiln, F. L. Smidth.
1 Microrok Top 3rd Press roll, Stowe-Woodward, Inc.

New Combination Rag Washer and Beater at Hurlbut

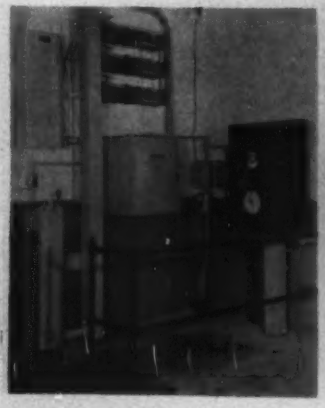
The Hurlbut Paper Co., South Lee, Mass., has recently installed a new washing and beating combination unit, built by E. D. Jones & Sons Co., for the treatment of rag stock.

This washer beater unit, as shown in the accompanying photos, is a Hollander type machine built entirely of stainless steel, even including the tub bottom. It is equipped with two dump valves leading to separate systems, one to the drainers and one to a beater chest.

Some of the interesting features of this machine include an all stainless steel cylinder washer with separate electric drive and hydraulic raising and lowering mechanism; Taylor automatic roll control; and flushing devices for quick and easy dumping.

Early reports from this installation indicate that the unit will efficiently prepare half stock from cooked rags and well beaten stock for the paper machine. The washer beater unit is easily furnished and dumped and kept clean; and is especially outstanding because of the automatic control and its ability to reproduce characteristics from one batch to another.

Taylor control panel and starting equipment for washer beater unit.



Washer beater unit.

New *Sandy Hill* Multi-Vat Board Machine with many unusual features

Versatile custom-designed machine makes everything from patent coated to test liner. Produced marketable board immediately on start-up.

Above: Complete Board Machine. Available overhead room in this plant made possible the special arrangement for cleaning of the top wet felt and the second press felt.

Below: Dryer section showing the sturdy box type framing and ring oiling bearings.

Above: (Open-side) Calenders with new Sandy Hill designed anti-friction bearings and pneumatic load and lift.

Yankee Dryer Section. Unusual, but extremely practical, in board machine design.

In accordance with Sandy Hill's policy of working closely with its customers, this complete board machine was built with individual mill problems and marketing goals in mind. To achieve a high finish on one side of the board without reduction in bulk, a Yankee Dryer Section was incorporated . . . an unusual step on a board machine. Another revolutionary feature is the open side calenders using anti-friction bearings and pneumatic load and lift.

The Sandy Hill sales-engineering group welcomes an opportunity to consult with you, whether your needs are for a standard item of equipment or a completely custom-designed pulp and paper plant.

Write for our Brochure of Pulp and Paper Making Machinery.

Sandy Hill Iron & Brass Works

Hudson Falls, N. Y.

Machinists and Founders Specializing in Paper and Pulp Mill Machinery

Manufacturers of
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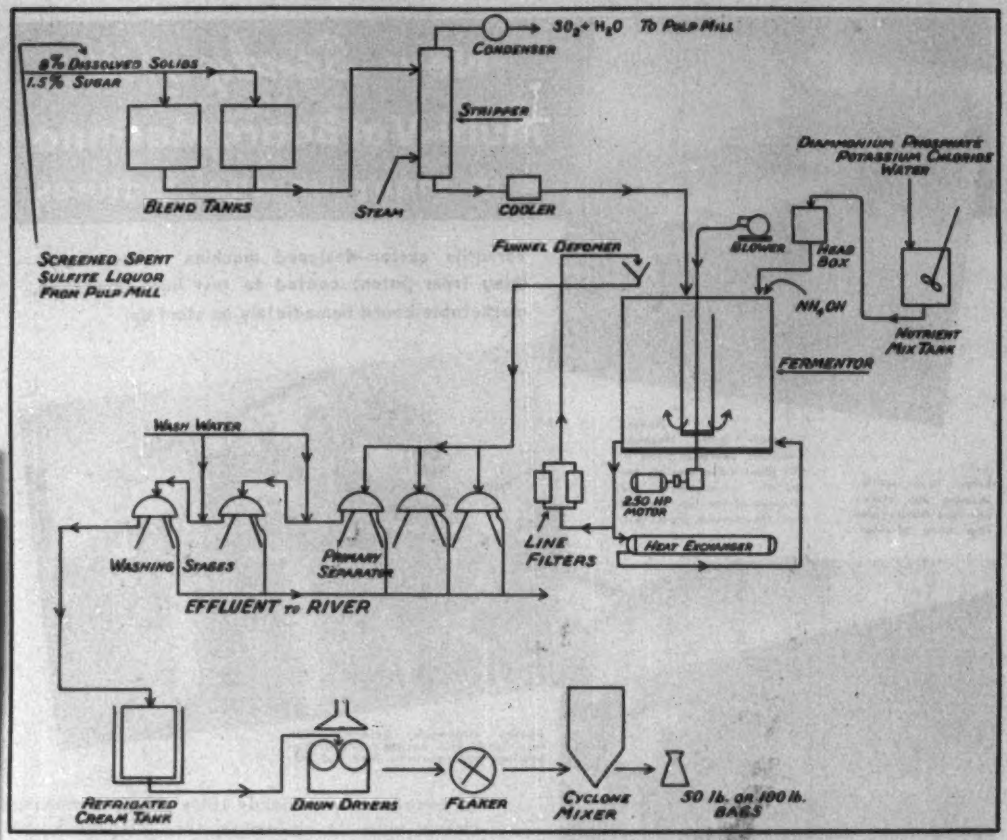
Bertrams Shakes

Nelson Slice
Feltmess Wet Machines
"Selective" and Corner Drives
Fourdrinier Paper Machines
"Packer" Screens

Castings
Bleaching Equipment
Scofield Felt Conditioners
Cleveland Type Bearings
Shaker Screens



Rhinelander Yeast Plant

E. P. McGinn
Industrial Editor, Paper Trade Journal

For the past several years several of the state governments have been exerting considerable amounts of pressure on pulp and paper mills to reduce the B.O.D. of the mill effluents being discharged into rivers or other streams. Some of the prime targets for such activity have been the Sulphite pulp mills because of the large volumes of effluent and comparatively large amounts of oxygen consuming organic material in the effluents.

The principal oxygen consuming constituent of sulphite waste liquor is the fermentable sugar. Consequently there has been a considerable amount of interest in processes, such as fermentation of ethyl alcohol or the manufacture of yeast, that utilize these sugars.

Although the fermentable sugars constitute only 18-20 percent of the total solids of the sulphite waste liquor yet they account for 70 percent of the polluting effect of a given amount of sulphite liquor.

Of course, after the sugars in the sulphite waste liquor have been consumed, it is still possible to utilize the remaining solids, mostly calcium lignosulphonate, as an adhesive, road binder, emulsifier, etc. or for the manufacture of vanillin.

During the past few years there has been a great deal of research work, as well as pilot plant and commercial evaluation, of other methods of using sulphite waste liquor in addition to those mentioned above. The three other principal methods of utilizing sulphite waste liquor and eliminating stream pollution therefrom are:

(1) The use of magnesia base liquor with burning of organic matter and recovery for re-use of all chemicals and heat; (2) burning calcium base liquor to recover heat from combustion of organic matter but very little recovery of chemicals; (3) the use of ammonia base liquor with burning of organic materials for recovery of heat of combustion, with recovery of SO_2 and partial recovery of ammonia and possible full recovery of ammonia in the future.

One of the drawbacks to all of the above methods is the high initial cost of equipment. Because of the corrosive nature of the waste liquor it is necessary to use stainless steel or other acid resisting materials and because the material is so dilute, with consequent large volumes, it is neces-

Tissue Output Up 3 Tons...No Increase In Pressure

Perhaps, like many businesses, you've felt that the major keys to extra capacity were overtime and additional production facilities.

Before you decide on either, read *this* story.

When a conventional type dryer roll cracked in operation, a leading producer of tissue called for a replacement that could stand up under heavy-duty and at the same time deliver even greater production.

Installation of a Lukenweld Jacketed Steel Dryer Roll (12' x 136" Face Yankee), designed to withstand a working pressure of 100 psi, proved the right answer. Results: faster drying . . . production rates increased from 11.6 tons to 15 tons . . . an overall output boost of 3.4 tons per day.

Production increases like this can well be applied to *your own* output plans with Lukenweld Jacketed Steel Dryer Rolls. For Lukenweld Dryer Rolls, built to conform with ASME codes, can safely operate under greater pressures. Safety is assured through use of rolled steel plate (steel plate will not fail by shattering).

In addition to an improved drying process, Lukenweld Jacketed Steel Dryer Rolls offer you the advantages of reduced installation and maintenance costs . . . more flexible operation.

For information on drying and other processing machinery for the pulp and paper industry, write: Lukenweld, Division of Lukens Steel Company, 403 Lukens Building, Coatesville, Pa.

SPEED SALE OF YOUR SCRAP

Improved machinery for improved processes through engineering

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sary to use large sizes of tanks and other equipment.

Any of the above methods that use the method of burning the liquor to recover heat and/or chemicals have one big advantage in that there is an unlimited market for the product. That is, there is a ready use for all of the heat or chemicals that may be covered from burning all of the liquor produced in a mill.

The methods that produce such products as ethyl alcohol, vanillin, yeast or adhesive have the problem of marketing the product as well as manufacturing it. In the case of vanillin the potential market is so limited that it cannot absorb the production of even one mill.

The markets for ethyl alcohol and yeast depend upon the cost of production and the costs of competitive product or sources.

Yeast Production

The present annual productive capacity of sulphite pulp mills in the U. S. is approximately 2,990,000 tons. The figure has been fairly constant for several years and is not likely to change significantly within the next few years. If the spent sulphite liquor from all of these mills was utilized for the production of yeast (which is, of course, highly improbable) the potential production would be 281,000 tons per year.

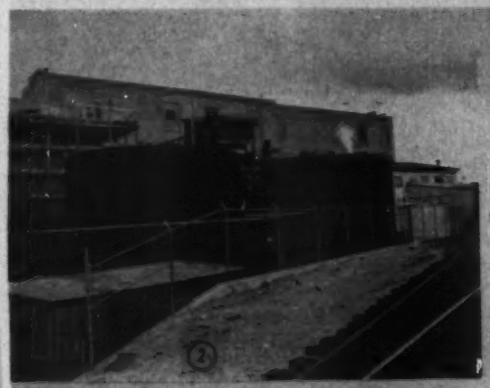
It has been estimated that in the mid-west alone there is a deficit of about 3¼ million tons of high protein livestock food and there is a potential market for 1¼ million tons of B-complex vitamin supplement in the same area. Since torula yeast, produced from waste sulphite liquor, may serve as either or both high protein food and vitamin B-complex supplement, it is obvious that the potential market is large enough and the cost of production as compared to competitive products becomes the governing factor of the volume of sales.

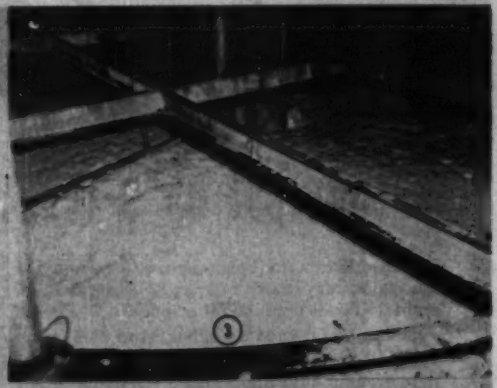
Three separate agencies in the U. S. have conducted research programs for the production of yeast for livestock food as follows. (1) Efforts of the U. S. Forest Products Laboratory have been directed toward the production of yeast from hydrolysis of wood waste. (2) The University of Washington department of chemical engineering has been operating a laboratory plant for the production of yeast from spent sulphite liquor for several years. (3) The Sulphite Pulp Manufacturers Research League has established a full scale commercial installation for the production of yeast from spent sulphite liquor at the Rhinelander Paper Company, Rhinelander Wisconsin.

The latter plant was built in 1948 and was operated by the Research League until recently when it was taken over by the Rhinelander Paper Company. This installation processes 140-180,000 gallons which is approximately one half of the total spent sulphite liquor produced in the mill. This liquor contains about eight percent solids and approximately 1.5 percent fermentable sugar.

The liquor is pumped from the mill blow pits up to a pair of inclined stainless steel, 80 mesh wire screens that remove the suspended fibers, which are collected and returned to the pulp mill. The filtered liquor flows to a pair of wooden blending tanks, each 26 ft. high and 30 ft. diameter. Each tank holds 125,000 gallons, a little less than one day's supply. The reasons for having such large storage

Figure 2—Liquor blending and storage tanks for yeast plant. Figure 3—Top of fermentor tank. Figure 4—Motor and hydraulic coupling for drive of fermentor agitator. Figure 5—Left, screen filters on circulating line of fermentor. Spare filter screens are shown at lower left. Fermentor circulating pump is shown at right rear.





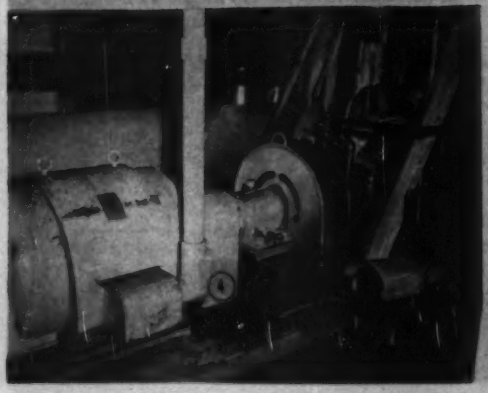


Figure 6—Sulphur dioxide stripping tower. Figure 7—Heat exchanger used for cooling liquor in the fermentor.

tanks are to insure an adequate supply of liquor even though the pulp mill may be shut down for short periods, and to provide sufficient volume so that small variations in the liquor received from the pulp mill will be blended into a uniform average product.

The entire yeast making process from hereon is continuous at a rate of 100-110 gallons per minute.

From the blending tanks the liquor is pumped to the SO_2 stripper. This is a stainless steel tower 5 ft. diameter by 22 ft. high. The interior is filled with carbon Raschig rings to provide a large surface area. The liquor flows down from the top of the tower and contacts steam admitted at the bottom. The liquor enters the stripper at a temperature of 160°F. and a pH of 2.5. The SO_2 is boiled out of the liquor and pulled out of the top of the tower with some exhausted steam into a spiral condenser. The water solution of SO_2 from this unit is sent to weak liquor storage in the pulp mill. The stripped liquor is drawn from the bottom of the tower and sent through a spiral cooler where the temperature is brought down to 80°F. before it enters the fermenter.

Except for the blending tanks which are wooden, all piping and equipment up to and including the stripper is made of or lined with 316 stainless steel. In the stripper the pH of the liquor is raised from 2.5 to 3.5 – 4.0, which together with the lower temperature, makes it less corrosive. Therefore from the stripper to the centrifugal separates all piping and equipment is made of or lined with 304 stainless steel.

The fermenter is 26 ft. diameter by 14 ft. high with a central draft tube 4 ft. diameter by 10 ft. high. At the bottom of the draft tube is an agitator of a special type, designed to blend air into the liquid. This agitator, which is driven by a 280 hp. motor through a reduction gear, pulls the liquid down in the center and forces it out and up on the outside. A Buffalo blower supplies 1500 c.f.m. of air through a 4 in. pipe to the agitator where it is mixed into the liquid to make a foam.

The fermenter has a total capacity of about 55,000 gallons but in normal operation contains about 46,000 gallons of which 24,000 gallons are liquid and 22,000 gallons are foam. As the liquor enters the fermenter a nutrient salt solution is added. This solution is made up in a 500 gallon wooden tank then pumped to a head tank from which it flows into the fermenter at the desired rate. An overflow line from the head tank keeps the level constant and carries the excess back to the make-up tank.

The nutrient solution consists of ammonium hydroxide, Di ammonium phosphate and potassium chloride. The ammonium hydroxide raises the pH to 4.5 – 5.5 but if necessary the pH may be adjusted by lime. The amount of ammonia added is based on the sugar content of the liquor coming in, since the growth of the yeast requires definite amounts of both fermentable sugars and the nitrogen provided by the ammonia. The other nutrient elements, phosphorus and potassium, are necessary but not in such definite amounts.

After a great deal of experimentation over a period of many years, in this country and abroad, it has been pretty well established that *Torula Utilis*, commonly called torula yeast, is the most satisfactory organism for the production of food yeast. This organism feeds on hexoses, pentoses and even acetic acid. It adapts itself very well to the rapid growth required by this continuous process. It is very resistant to contamination by other organisms and, finally, it yields a very desirable product which is high in proteins and vitamin content.

A typical analysis of the yeast product from sulphite liquor is shown in *Table I.*

Amino acid content of yeast produced from sulphite waste liquor is shown in *Table II.*

Figure 8—De Laval centrifugal separators used for recovering and washing yeast. Figure 9—Bulflovak drum dryer used for drying yeast.

Figure 10—Exterior of yeast plant at center, with new paper machine building construction at extreme left.

TABLE I.

Water	4.70%
Nitrogen	7.8 %
Protein	48.50%
Fat	0.90%
N-free Extract	35.0 %
Ash	8.? %
PrOh	4.48%

TABLE II.

2.4 %	Phenylalanine	3.8 %	Isoleucine
1.9 %	Tyrosine	3.0 %	Valine
0.7 %	Tryptophane	1.3 %	Histidine
0.8 %	Methionine	3.6 %	Arginine
0.7 %	Cystine	4.1 %	Lysine
0.22%	Glycine	6.9 %	Glutamic Acid
3.6 %	Leucine	2.6 %	Threonine

Vitamin B content of yeast produced from sulphite waste liquor is shown in *Table III.*

TABLE III.

Vitamin: mcg/g	
Thiamin	8.30
Riboflavin	44.5
Nicotinic Acid	417.3
Pantothenic Acid	45.0
Biotin	2.5

Since the fermentation of sugar to produce yeast is an exothermic process, provision must be made to remove a considerable amount of heat from the fermenter to prevent excessive temperature rise. For each dry gram of yeast produced from spruce sulphite waste liquor 3750 calories are liberated and for each dry gram of yeast produced from Beechwood sulphite waste liquor 4600 calories are liberated.

This heat is removed from the liquor in the fermenting tank by means of a large heat exchanger built by American Heat Reclaiming Corp. Liquor is drawn from the bottom of the fermenter and passed through this cooler at the rate of 1500 gallons per minute. From the cooler the liquor enters the fermenter at the bottom but on the side opposite from the outlet. The fermenter also receives some cooling from water running down the outside of the vessel. This unit is also equipped with four radial baffles to cut down rotary movement or swirling of the liquid.

The take-off line for the heat exchanger also supplies a by-pass line that puts the liquor at 100 g.p.m. through a pair of wire screen pressure filters and then runs it into a cone shaped head box located above the fermenter. From the head box the liquor flows to the primary centrifugal separators.

Liquor enters the fermenter at about 80°F. and leaves at about 90°F.

The plant is equipped with five De Laval centrifugal separators each handling 50 gallons per minute of liquor and rotating at 4800 r.p.m. There is also one Westphalia separator that handles about 35 gallons per minute, and rotates at 58000 r.p.m.

Usually one to three separators, operating in parallel, are used for the primary separation. Only one separator is required for the secondary washing. The concentrated yeast cream at about 14 percent solids is pumped to a 1000 gallon refrigerated storage tank. This six-foot diameter tank is heavily insulated to help maintain the constant temperature of 65-70°F. during time of operation. When the system is shut down or during week-ends the temperature in this tank is maintained at 45°F.

From this tank, the yeast cream is pumped to a Buflovak double drum dryer containing two 4 feet diameter dryer rolls, 10 feet long and heated with steam at 85 p.s.i. The yeast cream goes into the top nip between the rolls, which rotate down and into the nip. Doctors scrape the dried material from the rolls. It is then carried by conveyor to a flaker in which it is pulverized. The material then passes to a cyclone mixed with a hopper bottom from which it is loaded into 50 or 100 lb. paper bags for shipment.

LIST OF SUPPLIERS

Storage Tanks, Kalamazoo Tank & Silo Co., Kalamazoo, Mich., and Scott Taylor Co., Ashland, Wis.

Stripper, Manitowoc Engineering Co., Manitowoc, Wis.

Liquor Pumps, The Duriron Co., Inc., Dayton, Ohio.

Fabricated Liquor Lines, Trent Engineering Co., East Troy, Wis.

Condensers & Liquor Cooler, American Heat Reclaiming Corp., New York, N. Y.

Wort Cooler, Electric Steel Foundry Co., Portland, Ore.

Growing Tank, Chicago Bridge & Iron Co., Chicago, Ill.

Aerator, Appleton Machine Co., Appleton, Wis.

Centrifuges, De Lavel Separator Co., New York, N. Y. and Westfalia Separator A. G. Oelde, Westfalia, Germany.

Dryer, Buflovak Midwest Co., Mora, Minn.

Instruments, The Bristol Co., Waterbury, Conn.

Liquor Valves, Electric Steel Foundry Co., Portland, Ore. and Hasco Valve & Machine Co., Milwaukee, Wis.

Figure 11—Refrigerated yeast cream tank equipped with lightning agitator. Figure 12—Flaker, storage hopper and bag filler in yeast plant.

Rhinelander Present Expansion and Modernization Program

Scheduled for completion by early fall is a major expansion and improvement program which was undertaken by the Rhinelander Paper Co. early in 1950 and which will cost in the neighborhood of $3,500,000. Included in this expansion is a new paper machine for which a certificate of necessity has been extended by NPA for a 5 year amortization. The paper machine installation will cost over one and one-half million dollars.

This machine, built by the Beloit Iron Works, will have a wire 132" wide by 80' long. The drive will be a Westinghouse steam turbine driving directly into the line shaft from which it is belted to the various sections. Beater room equipment consists of an E. D. Jones pulpmaster, Jones Bertram beaters, and Morden stockmakers. All tanks and chests are of tile with Improved Paper Machinery Co. agitation and Gould pumps. All stock lines are of fabricated stainless steel.

Machine auxiliaries will include Bird centrifiners, Poirier vacuum box control, Valley inlet, Midwest-Fulton drier drainage system, Mason-Neilan drier control system, J. O. Ross Briner Economizer and Hood with the Ross-Grewin system on the driers. Cameron Machine Co. is furnishing the winder to which will be attached a mechanical unloading device with a hydraulic hoist built in to receive finished rolls.

The foregoing equipment will be housed in a machine room which is being built adjacent to our present No. 5 machine room and which, upon completion, will be one machine room 85' x 320' and will house both No. 5 and No. 8 machines.

This machine will produce glassine and greaseproof papers and will be a valued addition to the production capacity for the defense effort and essential civilian requirements as a perishable food packaging.

The new electric power generating plant is well along toward completion and these facilities will be housed in a completely new turbine building of

Figure 1—Exterior of building under construction for new paper machine. Figure 2—Building construction; foundations and sole plates for new paper machine. Figure 3—Tile stock tanks to be used for new paper machine. Figure 4—Two Bertrams beaters being installed for use on the new paper machine.

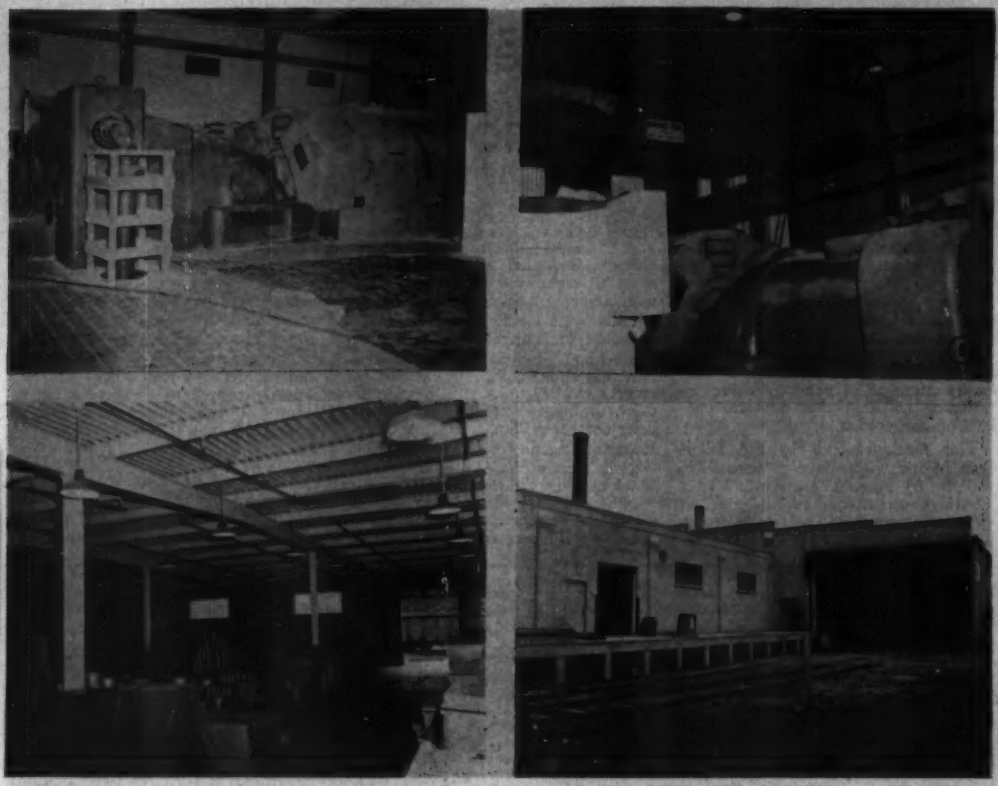


Figure 5—New 12,500 KW Westinghouse turbo-generator in final stage of installation in new power plant building. Figure 6—Another view of new turbine showing upper portion of new generator room and 25 ton crane. Figure 7—New warehouse used for finished products. Figure 8—New warehouse and loading platform left, and new enclosed RR siding and loading platform at right.

steel and masonry construction. This building is faced inside with glazed tile of two shades and the operating floor will be finished in buff tile. Carrying out further, the color scheme will be jade green switch gear and all turbines and generators in a complimentary color.

A new turbo-electric generating installation has been delivered and erection is practically complete. This unit, furnished by Westinghouse, is a 12,500 kilw. generator producing power at 12,500 volts and driven by a 10,000 kilw. rated 400 lb. steam turbine having a 15 lb. extraction stage and a full size condenser of 13,000 sq. ft. This unit will replace three older type turbines, two of which are presently in operation, and the third being held as a standby. Additional power will be supplied by an existing 4,000 kilw. 480 volt turbine which will be moved to the new turbine room after the new unit is in operation. This unit operates with a hot condenser for the production of hot water for processing in the mill.

As a result of generating power at 12,500 volts, it was necessary to install an entirely new electrical distribution system to replace the 440 volt system in existence. Power will now be distributed at 12,500 volts from the turbine room to load centers situated strategically throughout the mill where it will be stepped down to 440 volts to feed the various departmental power circuits. This is a much higher voltage than is used in any paper mill in the area and is used in only one plant in the state of Wisconsin at this time.

As a means of combating stream pollution, the Rhinelander Paper Company has on order a Conkey 4-body triple effect evaporator for the evaporation of waste sulphite liquor which can be subsequently processed to bone dry powder or can be burned as such. This system will be capable of handling waste sulphite liquor directly from the digesters or effluent from the Yeast Plant which has been desugared by the yeast process. In conjunction with the same project, steps are being taken to install equipment for the conservation of sulphur in the form of SO_2 from waste sulphite liquor prior to the evaporation or yeast plant processes. Liquor being drained from Mitscherlich digesters at the end of the cook will be passed to a separator where the SO_2 flashed will be passed through a condenser and noncondensed gases or SO_2 will be introduced to a recovery tank by means of an eductor for absorption. The stripped waste sulphite liquor will then be accumulated in a tank from which it can be used to pad blow pits and furnish a supply for the evaporation and yeast processes.

In addition to many process improvements and expansion, the Rhinelander Paper Company has recently completed a 16,000 sq. ft. warehouse which is half of the warehouse expansion program, the balance of which will be completed later in the year. This additional warehouse capacity will be used for the storage of finishing room supplies and finished paper awaiting shipment.

LIST OF SUPPLIERS

Paper Machine, Beloit Iron Works.
Bertrams Beaters, Pulpmaster, E. D. Jones Co.
Stockmaker Refiners, Morden Machine Co.
Turbo-generator, Paper Machine, Drive

WHERE UNIFORMITY IS VITAL...

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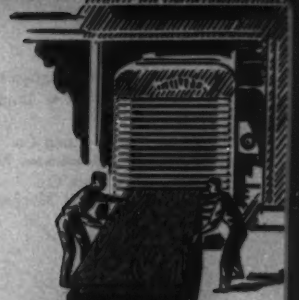

Production of high quality, properly bonded plywoods requires, above all, reliable resin adhesives. The specific use of the plywood determines whether a resorcinol-, phenol-, melamine- or urea-formaldehyde resin is most suitable. All of these resins require exacting formulation with chemicals of dependable uniformity and purity.

Heyden Formaldehyde—manufactured under rigid laboratory control from raw materials constantly checked for high purity—assures uniformly fine quality in the finished product, whether it be plywood, adhesive, plastics, paper, textiles, dyes or a hundred and one other critical materials. It is a clear, colorless solution assaying not less than 37% by weight—produced as Formaldehyde Solution N.F. or as Methanol-free Formaldehyde. It is shipped in container sizes to suit your needs—tank cars, tank trucks, drums, carboys and bottles.

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Steam Turbine, Westinghouse Co.
Stock Chest Agitators, Improved Paper Machinery Co.
Pumps, Gould Pump Co.
Hood, Briner Economizer, Ross-Grewin Air System, J. O. Ross Co.
Winder, Cameron Machine Co.
Generator Room Crane, Milwaukee Crane and Service Co.
Centrifugers, Bird Machine Co.
Paper Machine Dryer Control System, Mason-Neilan.
Dryer Drainage System, Midwest-Fulton.
Vacuum Box Controls, Poirier Co.
1 Microrok Top 3rd Press roll; 1 Microrok Top Press roll; 1 Bottom 3rd Press roll; 1 Stonite Top 2nd Press roll; 24 Table rolls; 2 Bottom Press rolls; 1 Bottom 2nd Press roll; 1 Top Size Press Microrok roll; 1 Suction Press roll; 1 Bottom 4th Press roll; 1 Bottom Size Press roll; 1 Top 4th Press Microrok roll; Stowe-Woodward, Inc.

Hudson Sharp Continuous Operating Toilet Winder

After fifty years of continuous improvement in toilet winder production, the Hudson Sharp Machine Co. has completed and installed new winders that operate continuously at a constant speed and which deliver uniform count rolls without stops, other than a change of parent rolls.

Each shaft of completed rolls is carried through seven stations during the winding process. Ten winding shafts are used to complete each cycle. The operator places a core the entire width of the parent roll in station No. 1. It is carried to station 2 where the cores are cut to required width. Station 3 places glue on the individual cores. The paper is attached to the cores in station 4 where it is automatically broken from the preceding roll. The proper number of sheets are wound on the cores at station 5 and the webs are broken and the loose ends are carried back to station 3.

The loose tails are wound on the completed rolls in station 6 and is delivered to the cycle at station 7. The whole operation calls for two manual processes, viz. loading the core shafts and removing the completed rolls.

The parent roll contacts an unwind roll with a uniform tension control. The glue is applied hot or cold by glue wheels. The perforation roll is fitted with means to provide a uniform perforation.

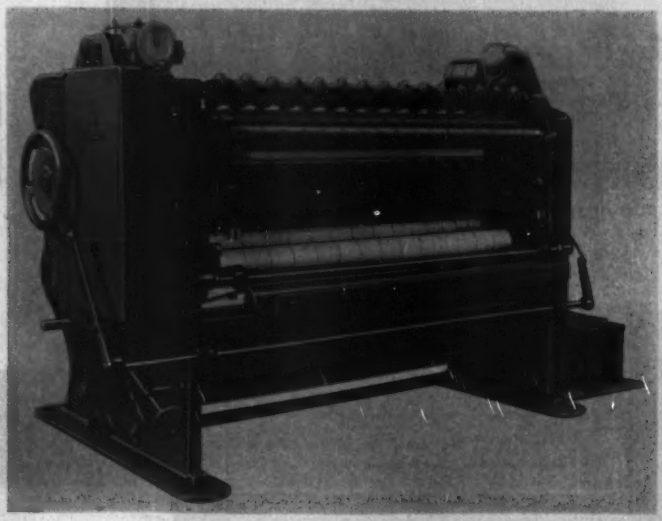
An embosser can be attached to the unit so that the paper may be embossed with any uniform pattern during the winding cycle. The machine may be built to accept rolls up to 81 inches in width.

While the automatic features of the machine demands a more or less standardization of its output, means are provided for a limited number of sheet counts.

One machine installed is producing as high as twenty-four cases per hour with 650 sheets per roll. In all cases the output of machines installed the production is well over the normal production of the machines they have replaced.

It is obvious that uniform parent rolls without breaks should be used. The ideal paper for the machine would be semi-crepe and facial tissue although straight machine papers are used on the machines with a satisfactory production.

Hudson Sharp Winder



Rotary Cutter for Printed Web

The Smith & Winchester Mfg. Co. have developed a new type of Rotary Cutter for cutting preprinted webs of paper, foil or laminated material to such close register that a pile of sheets may be cut on a paper trimmer or die press and all printed patterns will be in register with the cut.

Features found on no other cutter allow the sheets to be cut from a printed web so they will be in positive register and square, being controlled by a micrometer adjustable drive and electric eye.

Heavy construction, standing on its own base produces a ridged machine which does not depend on the floor to prevent it from getting out of square.

These machines may be attached to the delivery end of a printing press or may be used to cut from a printed roll. The overlapping delivery and stacker will stack and jog the pile of cut sheets also count and mark the pile. The machine is built in several sizes and will run at 200 cuts per minute or 500 feet of paper per minute.

So easy to give slime the go-away sign

with Du Pont Lignasan® X

FUNGICIDE AND BACTERICIDE

It's handy—Just add a 4-oz. envelope of "Lignasan" X into the system. It disintegrates easily. Water soluble for quick action, "Lignasan" X goes to work immediately eliminating slime throughout the system.

It's effective—"Lignasan" X is a powerful fungicide and bactericide . . . low concentrations prevent slime build-up in pipes, screens, chests and headboxes. It is also a convenient way to preserve slush pulp, coating compositions and paper makers' alum.

It's economical, too—In most cases, a 4-oz. envelope of powerful "Lignasan" X is enough for biological control of a ton of fiber. In addition, "Lignasan" X is available in bulk if you want to make up solutions to be bled into the system. A Technical Representative will be glad to show you how you can use "Lignasan" X most effectively. Write E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington 98, Del.

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

The Camas Story

August 1, 1950 to August 1, 1951

Picture, if you will, a paper mill using eight different types of wood, producing fourteen different kinds of pulp, making over 700 tons of paper into thousands of grades and specifications, and converting many of these into final products such as bags of all types, napkins, wax paper, toilet paper, paper towels and facial tissue. This is a brief picture of the Camas Mill. Handling the wood and producing the chips for this mill naturally requires a very diversified wood preparation system, and incorporated in it is not only the conventional river logging and saw mill methods, but also the new salvage logging techniques of the Pacific Northwest.

Wood Mill

Step 1—The first step of the new wood mill went into operation eighteen months ago. This mill has many new features which were required because of new logging methods, the use of bundle rafts, the hydraulic barker and the whole log chipper. In short review, there is no log haul as is customary, but a bridge crane with grapples that has a capacity of 50 tons of logs and cantilevers 70 feet out over the river. Log bundles are placed on the log deck where the bands are removed. Each log then passes a 108" circular cut-off show where they are cut into 24' lengths and then passed through the modified trunnion type hydraulic barker. The barked logs are next sent through a log washer and to the 153" 6-knife whole log chipper. This chipper takes a log 34" in diameter.

Step 2—The second step of the new wood mill is the addition of a 10' band mill for log breakdown and the installation of trimmer saws for grinderwood. This unit is just completed and ready for operation. The band mill will be used to break down logs to 34" for the 153" chipper and to 14" cants for grinderwood blocks. One feature of the band mill is that it is operated by one man, a sawyer who loads, sets, saws and off-bears from one location. A return conveyor with Vee rolls is provided to return logs to the saw should they require further breakdown. An inspection station and log turning device is provided between the transfer chains behind the band mill. The equipment installed is a Vee roll section, and in between are four short section chains on a 12" lift. These chains can be raised and used to turn the log for inspection and spudding, if required.

Future

A third step is now under construction and will in operation later this year. This will include a dry log haul from the yard fed by a log pond with a jack ladder on one side and sets of transfer decks on the other side, a 30" ring barker and a 107" multiknife chipper. This installation will be integrated with the present mill so that either barker can feed logs to either chipper.

Receipt of Logs by Rail—The receiving of 8' logs in rail cars is new at Camas. This equipment purchased to unload the logs from the gondola and flat cars was a 1½ yard crawler crane with a one cord pulpwood grapple. The logs are loaded crosswise in the gondola with a solid stockade at each end and vertical logs every 4' around the sides. All logs above the height of the gondola frame are banded in one cord units and then the entire load is banded all around the sides. With the completion of the third step, the mounting of the control cab on top of the crawler crane, will increase the unloading rate. In addition, the logs will be unloaded into a log pond equipped with a jack ladder that will feed the log haul and eliminate any further handling in the yard.

Farmer Wood—Along with the 8' pulpwood rail receiving, farmer wood is received in eight foot, sixteen foot, and twenty foot logs. An average of 200 cords is received per day consisting primarily of second growth red fir and the balance in cottonwood and alder. The farmer wood is unloaded

Here's Why SIMONDS SLITTERS Cut Longer . . . they're FORGED!

Simonds method—manufacturing from forgings. Creates dense grain structure at cutting edge without directional properties, which tests prove to be the most desirable structure for slitters operating against hardened steel rolls.
Conventional method manufacturing from bar stock. Grain structure follows direction of rolling, creating a uniform but undesirable structure at cutting edge for slitters operating against hardened steel rolls.
FORGED SLITTERS

STURDY NEW DESIGN BOX HOLDS FIVE SLITTERS

This new package tells the "inside story" of the unmatched performance of Simonds Forged Slitters on every score-cutting job. Simonds Special Steel (forged for added toughness) plus controlled hardening and grinding to exact specifications, add up to longer runs, with fewer sharpenings and longer cutting life from every Slitter. So, for lowest slitting cost, see your Simonds Distributor about "Red Streak" Forged Slitters . . . available from stock in all standard sizes.

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into storage areas by species and lengths. With the completion of the third step, most of the farmer wood will be unloaded onto transfer decks that will feed the new log haul. This phase will eliminate any further yard handling. The species not being cut will be unloaded in storage areas.

The movement of farmer wood from the rail unloading point or from the storage area to the mill is handled by skid loaders. Three skid loaders are operated, each having a one cord capacity and mounted on diesel tractors. On the mill grounds the best operation for both wood handling and tractor maintenance is with the extended track on the tractor. Also, cabs have been added on each tractor.

Purchased Chips — Along with the new salvage programs in the Northwest, chips are being purchased from suppliers in Oregon and Washington. To handle chips, rail box cars have been converted by removing the roof and leaving the top open. A 40 car spur was built and chip cars are moved and spotted by an endless cable winch. A suction system with a rated capacity of 24 units per hour was installed to unload the chips. A 150 hp. motor provides the power on the exhauster to lift the chips 90 feet through the cyclone and to the silo storage bins. The operation has averaged 15 units per hour, or about 7 cars in 8 hours with a four man crew To increase the unloading capacity, a twin system is to be installed.

Chippers and Chip Storage — From the 153" chipper a flight conveyor feeds the chips to a 72" belt that takes the chips to the tops of the concrete silo storage bins. These six silos are each 75 feet high, 44 feet wide, having a capacity of 400 units each or 160,000 bd. ft. A motor driven 72" tripper feeds the chips from the belt in to the silos, where species are segregated. With the new chipper being installed a 42" belt will parallel the 72" belt and will have a plow for each silo. The railway delivered chips coming through the pneumatic system feed a 36" flat belt over 3 silos with plows at each silo. Chips are discharged from the silos by a revolving disk feeder that plows the chips to a 42" belt. Each silo can feed at a rate of 14,000 feet per hour. Space is provided for two additional Chip Silos.

Chip Screens and Conveyors—From the silos a 42" belt carries the unscreened chips to the screen room. An over head flight conveyor distributes the chips over the chip feeders which supply the screens.

Each screen has a feeder box and a rotary feeder to maintain a uniform flow of chips onto the screen. Four 6' x 16' double deck "Low Head" vibrating screens are used. The top screen has 1¼" square perforations and the bottom screen has 3/16" circular perforations to retain accepted chips and pass fines and sawdust. Each screen has a rated capacity of 12,000 bd. ft. per hour, however, actual operations are close to 14,500 bd. ft. per hour. The accepted chips go onto a 36" belt that carries them to the pulp mills. The over size chips go through a 36" disk re-chipper and feed back through the screens. The fines and sawdust are blown to a cyclone that feeds a sawdust screen where all waste chips are salvaged by a ¾" x ¾" screen and sawdust is blown out for hogged fuel.

The belt conveyors used in chip delivery are all equipped with 45 degree idlers that trough the belt. This troughing has increased the capacity of a given belt size approximately 30 percent. The conveyors operate in speeds varying from 330 feet per minute for the 72" belt to 630 feet per minute for the smaller belts.

Sulphite Mill

Waste Liquor Disposal — During this period the Camas Mill has installed a pipe and open ditch system to convey waste sulphite liquor and disperse same in the main channel of the Columbia River.

The waste liquor flows by gravity from the blow pits through 117' of 30" type 316 stainless steel pipe to a tile lined concrete sump.

From this collecting sump the waste liquor is handled by a 7500 GPM pump discharging through 2600' of 30" rubber lined pipe. This pipe traverses south across the Mill property thence under the waters of the Columbia Slough discharging into an open ditch on the north shore of Lady Island.

The ditch extends 3500' to the south shore of Lady Island terminating in a tile lined concrete outfall sump.

From this point a 30" rubber lined pipe carries and distributes the waste liquor into the main channel of the Columbia River. Here the rate of flow in the river is sufficient, even during the low water stages, to provide the necessary dilution to meet the requirements of the Washington State Pollution Control Commission.

Cooking Acid Storage—Two of the 100,000 gal. capacity wood stave acid storage tanks have been replaced with stainless clad steel.

Paper Machines

During the past year there have been several minor improvements made on the paper machines at the Camas Mill. These improvements have resulted in better operating conditions, increased production, and improved quality.

No. 1 and 2 Machines—All of the paper machines operating on tissue grades have benefited from improvements made to the machine oc machine system. On No. 1 and No. 2 Paper Machines, the pressure roll installations were rebuilt. New lever arms with antifriction bearings were installed and the 14" diameter pressure rolls were replaced with 24" diameter rolls. This improvement to each machine has resulted in better machine operation, longer felt life, and a small increase in speed.

No. 3 Machine—Uniformally treated stock for No. 3 Paper Machine from the Jordan has been provided by the installation of the Jordan plug pressure control system. This control system maintains a predetermined pressure between plug and shell knives of the Jordan engine, thus providing stock to the head box that has been uniformally treated.

No. 6 Machine—No. 6 Paper Machine has been provided with a new steam turbine drive to replace the steam engine. The engine replaced was a 21" x 36" twin drop piston valve engine. The turbine installed was a 991 hp. at 350 p.s.i.g. and 625°F. The turbine operates with a back pressure of 40 p.s.i.g., with the exhaust steam used in the machine dryers. Better machine operation has resulted from this installation, with production increased from 5 to 10 percent. Improved drying has also resulted from this change.

No. 9 Machine—Changes to No. 9 Paper Machine have included the installation of an open face couch roll which has resulted in better sheet pick-up from the wire.

No. 10 Machine — Improvement in quality of paper from No. 10 Paper Machine has resulted from installation of a Dirtec system consisting of fourteen primary and fourteen secondary units. Not only has the cleanliness of the paper improved, but improvements in the coating operation have resulted by eliminating impurities from the coating rolls. A new exhaust fan over the coating rolls and a coating distributor for feeding coating to the gate rolls has also improved the quality of the coated paper.

No. 11 Machine—A new couch roll hanger was installed on No. 11 Paper Machine. This new hanger has improved pickup of the sheet from the wire. Some increase in wire life has also been noted.

No. 12 Machine — A new exhaust hood and exhaust fan were installed on the Yankee dryer for No. 12 Paper Machine, resulting in improved drying and increased production.

No. 14 Machine—No. 14 Paper Machine has been provided with increased drying capacity by replacement of the steam coils in the Yankee air heater.

No. 15 Machine—No. 15 Paper Machine has also had minor changes during the past year. A sealed top has been installed on the Beloit head box, making pressure-vacuum head control possible. Three new rectifier rolls have been installed, resulting in more even formation across the wire. Increased production from the machine has been possible by use of higher steam pressure in the dryer section. A vapo jet system for adding moisture at the reel has also been installed. This unit has resulted in a better, more pliable sheet.

D media

profits!

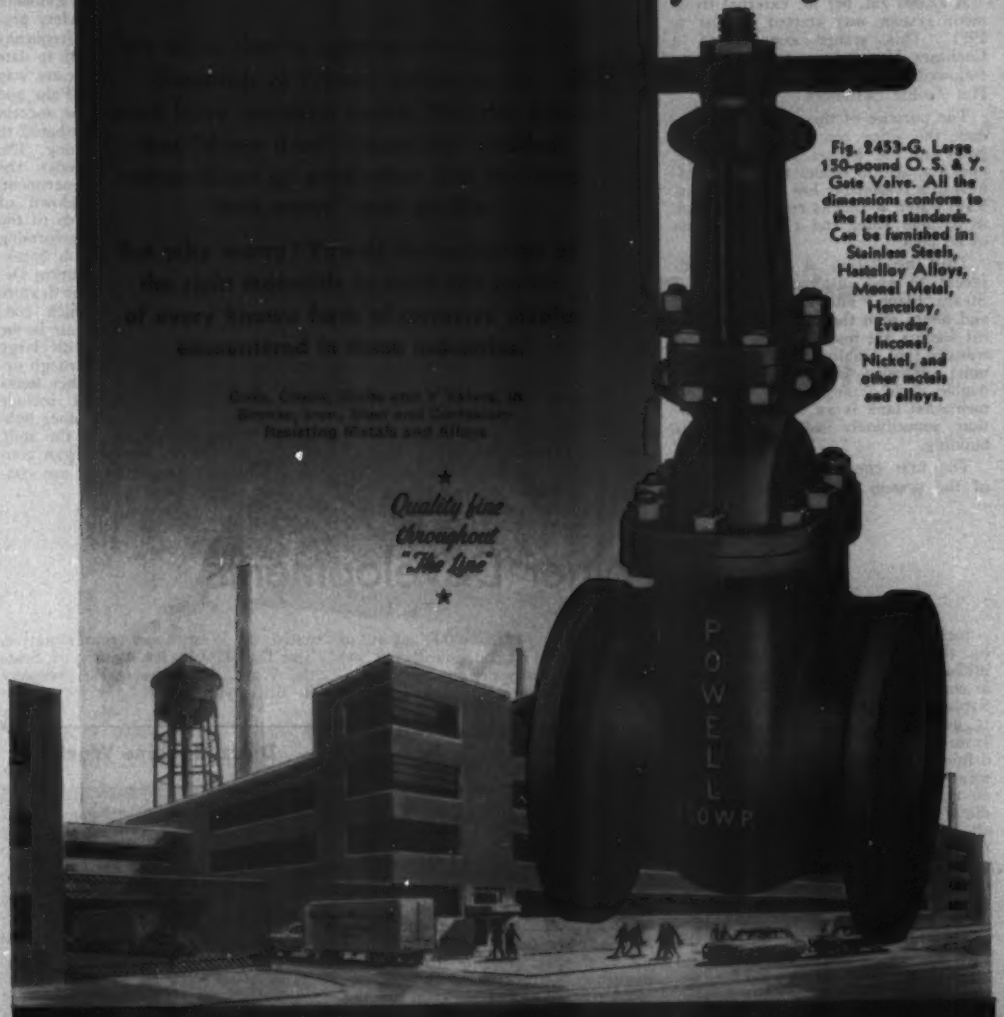


Fig. 2453-G. Large 150-pound O. S. & Y. Gate Valve. All the dimensions conform to the latest standards. Can be furnished in: Stainless Steels, Hastelloy Alloys, Monel Metal, Herculoy, Everdur, Inconel, Nickel, and other metals and alloys.

★ Quality first throughout "The Line" ★

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

Boiler Feed Water Treatment

During the past 20 years an internal treatment of boiler feed water has been in use at Camas with a high degree of success. Changing conditions of raw water and the higher rates of heat transfer present in the latest design boilers have made it necessary to install an external treatment system.

A 72,000 gal. per hr. external treatment system was started August 6, 1951. This system consists of a Cochrane Hot Process water softener followed by filters and a bank of four Hot Zeolite Softeners.

The purpose of this system is to reduce the silica content of the water going to the boilers to less than 2 ppm and also to reduce the total hardness to a reasonably low concentration. Raw water at Camas contains as high as 35 ppm Silica and a total hardness of 66 ppm.

This installation at Camas is adjacent to and just north of No. 2 Steam Plant. The Zeolite softeners and filters with the pumps and chemical feeders are installed in a steel and transite type building with the Zeolite units supported over the filters in a double deck arrangement. The sedimentation tank is an outdoor installation immediately adjacent to this building.

The first checks on the operation of the system are very encouraging. The boiler water has been cleared of the high concentration of suspended solids that had been objectionable and the internal treatment has been very greatly reduced.

It is planned to continue internal treatment as a safety measure and to maintain the best possible boiler water conditions in the boilers.

Handling Pulp in Yard Storage

The unloading of pulp from rail cars has been modernized through the use of a fork truck and Scoopmobiles. The fork truck removes the pulp from the car and places it on the pallet boards and the Scoopmobile transports the loaded pallets to the storage area. Scoopmobiles prove valuable for other miscellaneous uses around the yard such as moving lumber, dirt, etc.

Yard and Parking

The disasterous flood of 1948 together with the extensive post-war extension program has torn up the gardens and lawn which previously were feature attractions. An improving program has been carried on during the past twelve months which has been aimed at beautifying the whole mill area. Approximately 51,000 square feet of lawn has been planted as well as nine new flower beds and new rock walls. A tree planting program is under way in which a wide variety of species is being planted in the outlying areas of the mill. With the added production facilities has come a problem of providing parking space for employees. During the last twelve months new areas have been provided for 186 automobiles.

Safety Program

Increased production facilities brought new problems in providing for the safety of employees. Evidence of the success of the mill safety program is the 1950 accident frequency rate of 5.78 and the 1951 rate to date of 4.37. These accident rates are way below the average for the Pulp and Paper Industry. Much of the success of this program can be attributed to greater coverage of job training. The Job Training Program, under the guidance of Training Department, provides the detailed breakdown of each job, stressing the hazards of the job and the best way for performing the work. These detailed job breakdowns are prepared by Operating Department supervision. Another feature of the Safety Program which contributes to the low accident rate is the regular monthly contacts with large numbers of mill employees through organized safety meetings. Other items for stimulating interest include monthly safety posters and other publicity at strategic parts of the mill. There are regular safety slogan contests and many departments are conducting safety contests.

New Poirier Developments

Included among recent developments by the Poirier Control Co. is the utilization of an observation plate as a component of the Poirier Master Syphon System. This syphon system is used in the extraction of water from the flat suction boxes on a Fourdrinier paper machine. The advancement is a revelation inasmuch as it is an entirely new approach, since it is the first time to our knowledge that all guesswork has been eliminated from water extraction by the actual viewing of vacuum at work. The observation plate enables an observer to view the internal functioning of the syphon chamber and make positive adjustments which assure the user of fully automatic action in water extraction at all times. This observation plate has permitted users to maintain the syphon system at peak efficiency at all times with unbelievable results and no effort; since once properly set the syphon system automatically corrects itself for varying conditions at the wire. With the advent of the observation plate as used in conjunction with the Master Syphon System, there is no longer need for doubt or guesswork in water extraction.

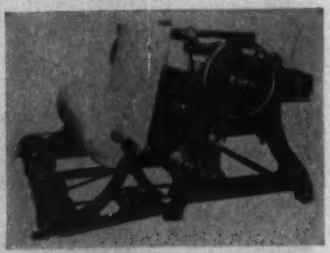
The Poirier Control Co. now has a Master Syphon System with a capacity of extraction of 6,000 g.p.m. of water installed on the Fourdrinier wet end of a specially designed paper machine. We believe this syphon system to have a greater capacity of extraction than any system ever put in operation on a paper making machine.

Another recent Poirier development is a newly designed patented valve designed primarily for use in the paper trade. The valve itself is a metal rotating disc which clears itself of particles which may adhere to the valve surface through the opening or closing of the valve section itself. The valve turns towards the point where impurities may have fixed themselves in the ways or on the face of the valve; thereby, clearing itself of said impurities and doing away with the usual possibilities of sticking, binding, etc., that are common to valves which do not include this patented feature.

The company also announced a new and important feature in stock controlling. This is the automatic control of the level in the overflow chamber, keeping the level of the stock at a given point at all times; and in this manner eliminating varying levels of stock in said chamber due to stock pump and its conduit, stock chest level and consistency changes.

The Poirier Control Co. has designated its West Coast representative, The Dan E. Charles Agency of Seattle, Wash., to represent the company in British Columbia.

Dietz Machine Works



Dietz Machine Works Golden Anniversary Model Toilet Roll Converter—Both Friction-rewind and Drum-rewind types with Parent Roll Drive and Automatic Tensioning—With the aid of the Parent Roll Drive speeds for all papers, including facial tissues, can be increased all possible without breaking webs and at the same time maintain a constant tension from start to finish of jumbo roll without any brake adjustments. Parent Roll Drives can be added to older type machines now in service.

Remember this character?

Just four years ago a Moore & White advertisement announced, with pardonable pride, that this old company had completed its rejuvenation. The ad bore the caption "Humpty Dumpty has been re-assembled," and included a portrait of that gentleman in the pink, as shown above.

Shortly thereafter, so help us, we received a telephone call from a man who asked to speak to "Humpty Dumpty." Humpty Dumpty, in the person of an M&W sales engineer, waited upon this prospect forthwith. Took the measure of his needs and distress, and saw to the prompt designing, fabrication, and delivery of $300,000 worth of Moore & White equipment. This customer, one of the nation's biggest paper-makers, has looked to Moore & White for his machinery needs ever since.

He is included in a roster of customers which has doubled in those four years. We have supplied equipment—from minor parts to complete assemblies—to nearly half the manufacturers of paper and paperboard in the country. Moore & White is a bigger factor in the industry than it has ever been before.

This commendable state of affairs can only stem from well-earned confidence in this revitalized company, throughout the paper-making industry. Confidence not only in the quality of Moore & White products, but in our ability and willingness to help solve today's knotty production problems. Humpty Dumpty is ready to hop to it when *your* call comes in!

The MOORE & WHITE Company

18TH STREET AND LEHIGH AVENUE • PHILADELPHIA 32, PA.

CUSTOM-BUILT MACHINES FOR MAKERS OF PAPER AND PAPERBOARD

Represented on the West Coast by Dan E. Charles Agency, 618 Jones Bldg., 1331 Third Ave., Seattle 1, Wash.

De-Inking Plant Expansion Includes Major Instrumentation

Robert B. Wolf, Jr.

Asst. Mgr., Pulp & Paper Ind. Div. The Foxboro Co., Foxboro, Mass.

Four years ago the Fitchburg Paper Co., Fitchburg, Mass., started to use an extensive, modern system of instrumentation to control some of the important process steps in their de-inking plant. The success of this instrumentation is reflected in the company's decision to incorporate additional instrument facilities in its de-inking plant enlargement and modernization now nearing completion. Designer and producer of all de-inking instrumentation is The Foxboro Co., Foxboro, Mass.

Upon completion, Fitchburg Paper's expanded de-inking plant will include three attractive, conveniently located instrument cabinets for over-all, centralized operation of equipment. Maximum production of highest quality de-inked pulp and peak operating efficiency will be attained through these instrument facilities. Equipment which will be automatically or manually controlled from the instrument cabinets includes: three hydra-pulpers, one of which is a new unit; a new high-density bleach tower; IMPCO washer and, following it, a consistency controller. In addition, levels and temperatures in important storage and process tanks will be controlled with the aid of instruments.

The following instrumentation is employed in the operation of each of the three hydrapulpers:

A Liquid Level Recorder is used to gauge the amount of hot water added. This instrument makes it possible to control defibring at a given consistency. By means of a Hot Water Temperature Controller, water added to the hydrapulper is preheated in the storage tank so that a minimum length of time is required to get up to cooking temperature. Substantially increased hydrapulper production is thereby achieved. Desired chemical action on the waste paper is assured by metering a proper dosage of caustic into the hydrapulper preparatory to defibring.

The cooking temperature is accurately controlled by a Hydrapulper Temperature Controller. This instrument permits cooking at the optimum temperature, assuring most efficient loosening of ink and maximum uniformity of de-fibred pulp.

Remote operation of electrical equipment and valves is accomplished at the instrument panel by means of various lever switches and pushbuttons. These are used in starting and stopping the hydrapulper drive motor, the lubricating oil pump, hot water transfer pump, and in dumping and rinsing the hydrapulper.

Indicating Gauges provide a visual check on pressure of gland water, lubricating oil, mill and hot water. A Recording Ammeter (Westinghouse) shows power input to the hydrapulper drive motor. Any tendency toward overloading shows up immediately on this instrument.

The accompanying photo shows the instrument cabinet installed in the original de-inking plant. The cabinet consists of three sections. The first (left) contains instruments and controls for Hydrapulper #1; the second includes level recording instruments, and a hot-water-in-storage temperature controller; the third, instruments and controls for Hydrapulper #2.

Mounted on one of the two control cabinets now being installed will be control instruments for Hydrapulper #3. The other new cabinet includes control instruments for bleaching, washing and regulating bleached pulp consistency, and bleached pulp flow.

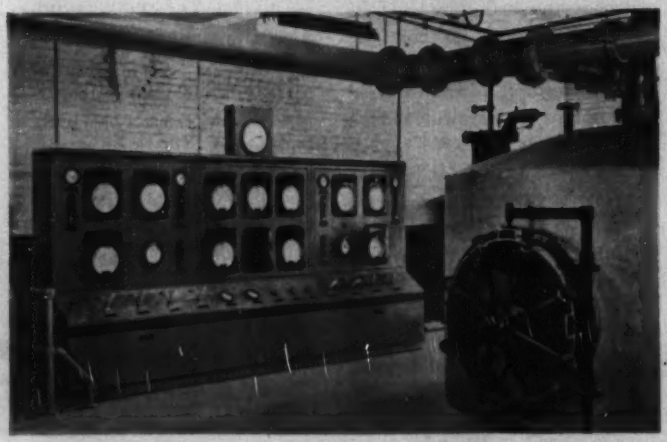
After hydrapulper treatment, the balance of the de-inking process is instrumented as follows:

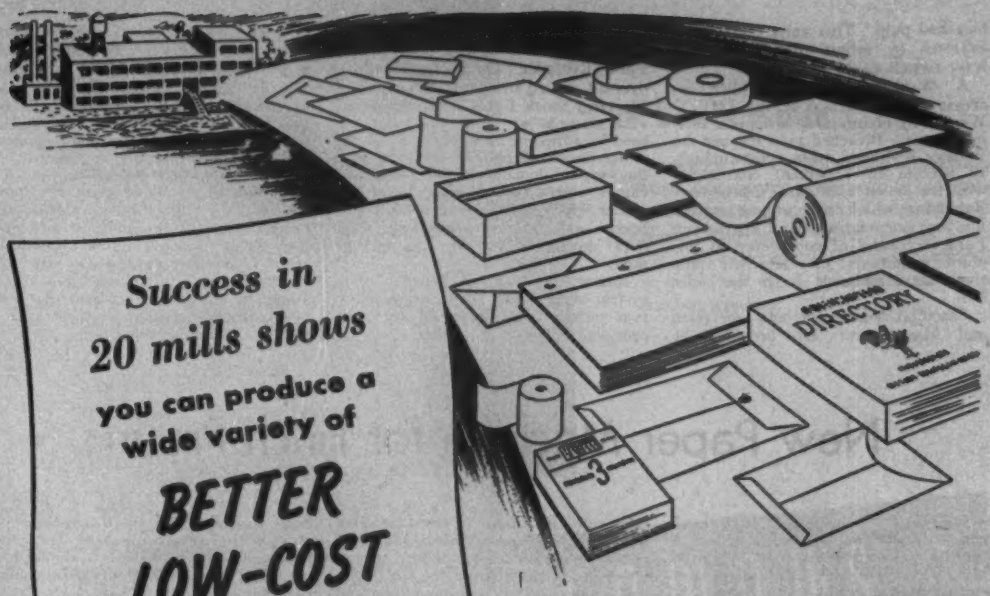
A Brown Stock Level Recorder keeps a continuous record of storage in the brown stock chest. This instrument makes it possible to balance hydrapulper operation with subsequent washing and bleaching steps.

Three instruments are responsible for controlling the bleaching operation at its highest efficiency. (1) A Flow Ratio Controller ratios the flow of bleach liquor to that of the brown stock. This assures adequate bleach application without waste. Bleaching is carried out continuously at the most effective temperature by means of (2) a Bleach Stock Temperature Controller. A specific level in the bleach tower itself is consistently maintained with (3) a Bleach Tower Level Controller. This assures maximum retention time by maintaining the highest safe operating level.

Operators never need to leave the control cabinet to adjust the water valve controlling the dilution of

Foxboro Cabinet Panel for Hydrapulper Control





Success in 20 mills shows

you can produce a wide variety of

BETTER LOW-COST PAPERS

Plan now for future production with the DU PONT PEROXIDE PULP BLEACHING PROCESSES

Experience in 20 important U. S. and Canadian mills has shown that Du Pont Peroxide Bleaching can enable you to meet the increasing demand for more and better low-cost papers.

And in mill after mill, the advantages of peroxide bleached groundwood have been apparent . . . savings up to 30% in fiber costs . . . improved brightness permitting the use of more bleached groundwood in the furnish . . . both sulfite and groundwood pulps upgraded!

Adaptable for use in bleaching groundwood, sulfite, soda, kraft and semi-chemical pulps, the Du Pont Pulp Bleaching Processes also provide a means of producing higher quality papers from your recovered paper stocks.

GET THE FACTS FROM DU PONT *today!*

The men who pioneered this modern method of pulp bleaching will be glad to work with you in planning an installation to meet your specific needs. For more information, just clip and mail the coupon below.

Tune in to Du Pont "CAVALCADE OF AMERICA" Thursday Nights—NBC coast to coast

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PEROXIDES

FOR GROUNDWOOD BLEACHING

AVAILABLE IN DRUMS AND TANK CARS	"Albone" 25	Hydrogen Peroxide, 25%
	"Albone" 50	Hydrogen Peroxide, 50%
	"Solozone"	Sodium Peroxide

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Mail this coupon now

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Delaware

Please send me further information about Du Pont Peroxide Bleaching Processes: (check application)

____Groundwood ____Sulfite ____Soda Pulp ____Kraft

____Semi-chemical pulps ____Waste-paper recovery

*Name*_____

*Position*_____

*Firm*_____

*Address*_____

bleached pulp. This valve is remotely adjusted by means of a convenient lever-switch valve operator.

A Washer Level Controller increases the efficiency of the IMPCO Washer by maintaining a definite level in the vat. Bleached pulp leaving the Washer is diluted from approximately 12 percent to 4 percent consistency with the aid of a DeZurik Consistency Regulator which is equipped with a Foxboro pneumatic control instrument. Positive control of consistency at this point conditions the bleached pulp stock for subsequent use in the paper mill.

Essential records for both Operation and Management are provided by three important new recording instruments. These are: a Bleached Pulp Flow Recorder which furnishes an over-all record of plant throughout, a Bleached Stock Level Recorder whose vital records of stock on hand are used in adjusting the operation of the entire de-inking plant to keep up with the varying demands of the paper machines, and a Bleach Tank Level Recorder which indicates available bleach liquor and aids in preventing spill-over during filling of the storage tank.

Among the over-all benefits of a system of de-inking plant instrumentation such as that described are: records and controls of important variables are directly before the operator at all times; positive, reliable control is provided without keeping him continually "on the jump"; optimum use of steam, water and chemicals effects substantial savings in these commodities; production of maximum quality and uniformity of pulp is assured.

The present modernization and enlargement of de-inking plant facilities at Fitchburg Paper Co. are part of an expansion program aimed at producing higher quality output at lower cost. From past experience with instrumentation in de-inking plant operation, the company is assured that the new instrument facilities will be major tools in achieving this end.

New Paper Machine for Finch Pruyn

Improved type Finch Pruyn head box arranged for attachment direct to screens and combined with 60" high fully adjustable slice; all stainless steel construction.

Fourdrinier Part suitable for a wire 75 ft. long, 122" wide, equipped with 30" diameter Downingtown suction couch, 6-7" wide stainless steel suction boxes, 18" diameter Sinclair dandy roll, 5" diameter rubber covered table rolls, 10" diameter brass jacketed wire rolls, high speed duplex shake, 3" permanent pitch wire table, special air-operated handling device for breast roll, copper and brass water piping and showers.

Press Part of improved, close-spaced design with 2-24" diameter rubber covered Downingtown suction presses and 24" diameter granite upper rolls. Pneumatic-controlled pressure loading with both presses of straight through arrangement and felts equipped with Scofield felt conditioners. Wet and smoothing press with 24" diameter bronze cased lower and 24" diameter rubber covered upper rolls.

Dry Part in 3 main sections having one upper and one lower felt on each section; first and second sections each comprising 14 paper and 4 felt dryers; third section, 11 paper and 2 felt dryers; all dryers 48" diameter, designed and constructed for 50 lbs. working steam pressure. Bowser lubricating system for main dryer and drive shaft bearings. Rope carrier device for threading the sheet through the dryer sections. Latest type steam joints with dual revolving siphons. All supporting framework of streamlined box pattern. Hi-tensil alloy gearing with welded steel protective guards.

Size Press comprising 24" diameter chromium plated lower roll and 24" diameter rubber covered upper roll with stainless steel size pan, brass showers, and special Mount Hope type adjustable spread roll.

Calender Stack comprising 10 rolls of 24" diameter bottom, 16" diameter next bottom, and 12" diameter upper, with Bowser oiling system for all roll bearings, pneumatic nip loading system, and Lodding doctors.

Improved Type Pope Reel with pneumatic adjustable loading mechanism and adjustable spreader to handle rolls up to 48" diameter.

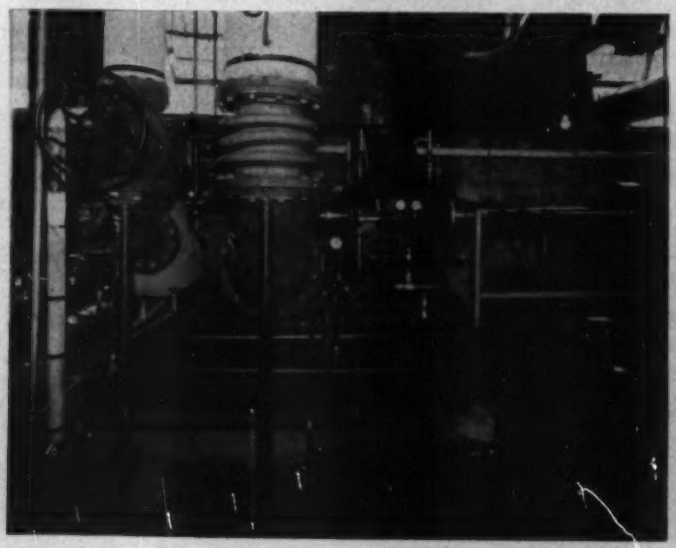
Unwinding Stands with adjustable bearing supports and electrical regenerative brake.

Pusey jones 2-drum winder of improved design, suitable for winding rolls up to 42" diameter, with special arrangement of score-cut slitters; variable speed direct-connected double motor drive.

Mechanical drive for each section with individual enclosed spiral bevel

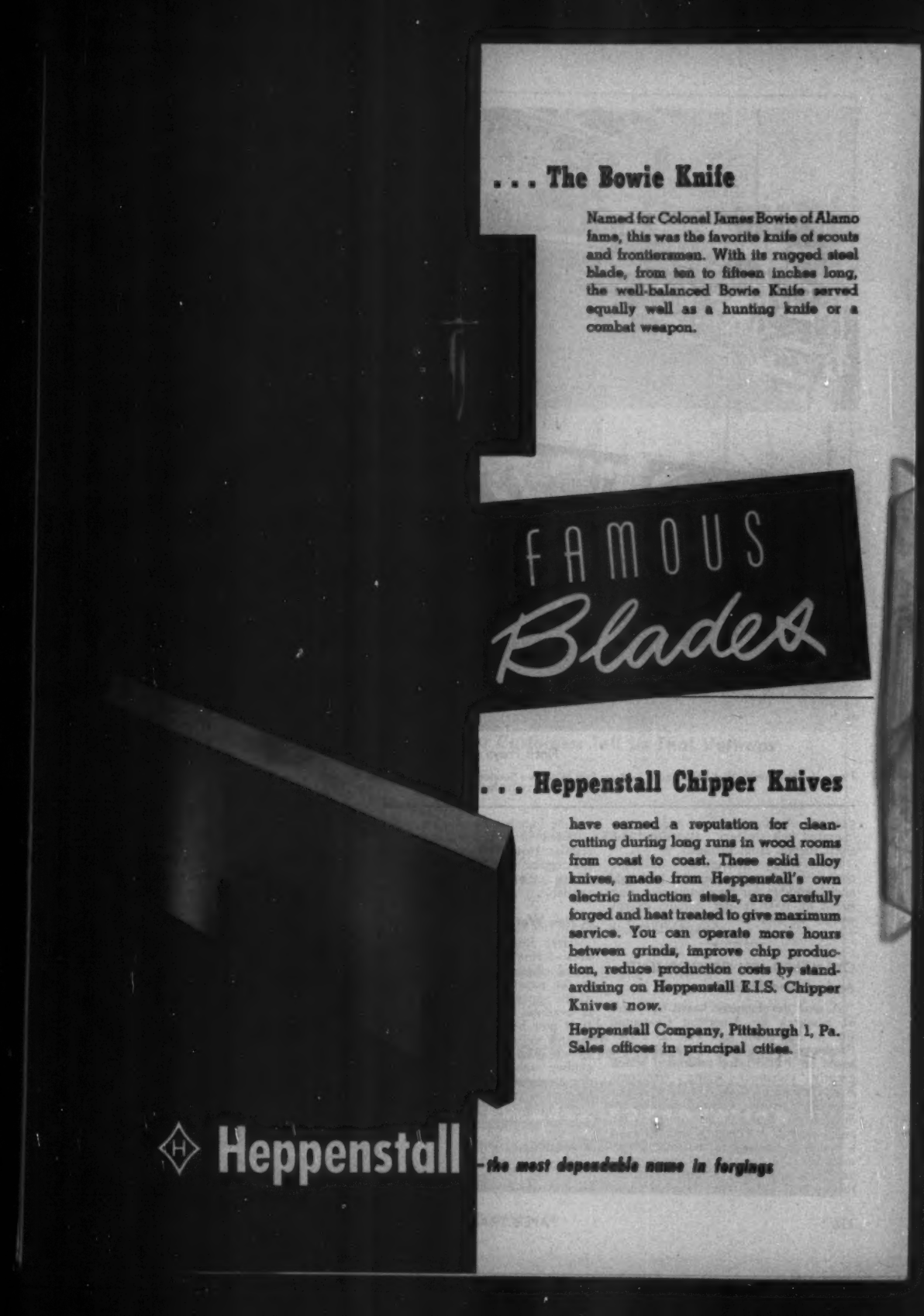
De Laval at Finch Pruyn

400 hp geared multistage turbine driving the new 122-inch Pusey and Jones Fourdrinier machine at Finch Pruyn Co. . . . With maximum speed change of 715 to 1, this De Laval turbine provides a wide range variable speed drive. It offers a maximum capacity rating of 525 bhp at 4945 rpm with a gear reduction to 480 rpm. Minimum operating turbine speeds go as low as 659 rpm geared to 64 rpm. . . . Anticipated future operation of this paper machine at 1200 feet per minute will utilize the turbine's top speeds. Currently the machine is producing at the rate of 1,000 feet per minute, requiring 375 hp at 4130 rpm geared to 400 rpm.



. . . The Bowie Knife

Named for Colonel James Bowie of Alamo fame, this was the favorite knife of scouts and frontiersmen. With its rugged steel blade, from ten to fifteen inches long, the well-balanced Bowie Knife served equally well as a hunting knife or a combat weapon.

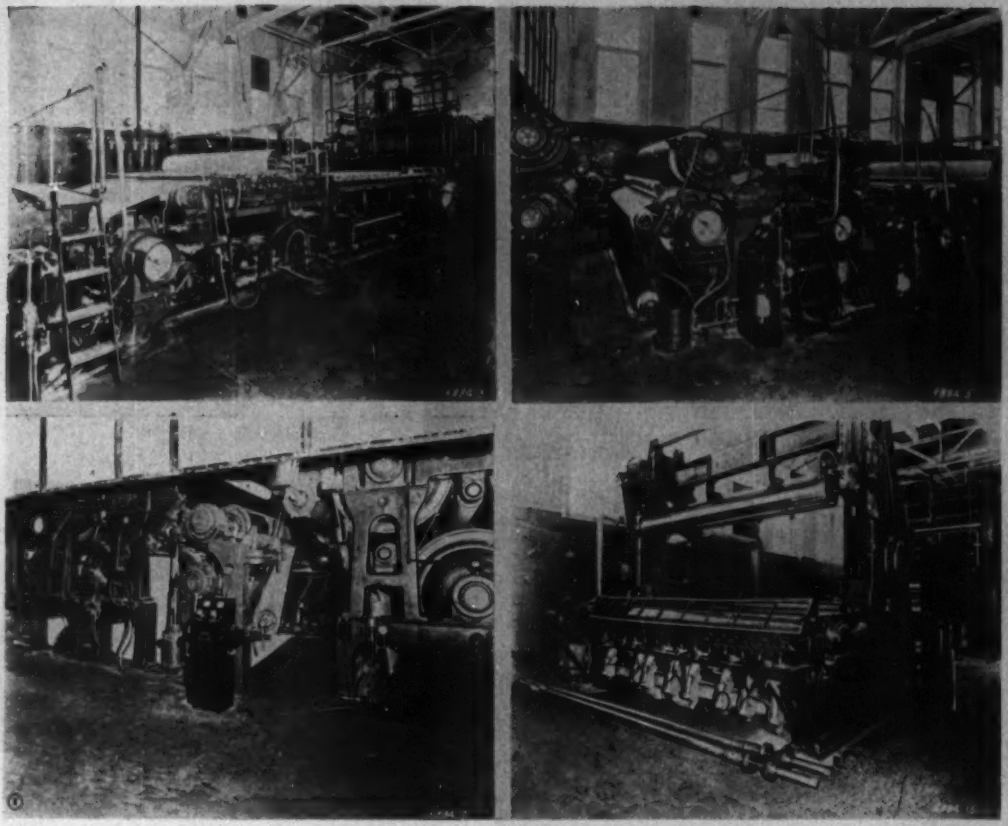


. . . Heppenstall Chipper Knives

have earned a reputation for clean-cutting during long runs in wood rooms from coast to coast. These solid alloy knives, made from Heppenstall's own electric induction steels, are carefully forged and heat treated to give maximum service. You can operate more hours between grinds, improve chip production, reduce production costs by standardizing on Heppenstall E.I.S. Chipper Knives now.

Heppenstall Company, Pittsburgh 1, Pa.
Sales offices in principal cities.

Heppenstall — *the most dependable name in forgings*



Finch Pruyn Paper Machine

Figure 1—Fourdrinier Wet End. Figure 2—Press Part With Two Suction Presses. Figure 3—Size Press Installed in Dry Part. Figure 4—Slitter and Winder.

gearing, Airflex clutches and motor-operated belt shifters. Basement line shaft driven from turbine.

All rolls throughout machine equipped with roller bearing and balanced suitable for maximum operating speed of 1000 ft. per minute, except winder at 3800 feet per minute.

CYANAMID 1951 DEVELOPMENTS

An Improved Rosin Size

A new development based on years of research by American Cyanamid Co. in the rosin size field is Paper Product 2270. This new rosin size is based on a modifying treatment which greatly enhances sizing efficiency. Better sizing of those grades of paper with high sizing specifications, and reduction in the amount of size for regular grades, give this new product a double advantage to the mill. Many mills are now improving their product and reducing their sizing cost with this new product. And in addition, it can be handled in existing equipment —stored in ordinary tanks used for regular rosin size, and emulsified by the regular batch or continuous emulsifiers. Commercial quantities are available.

A New Wet Strength Resin

Parez Resin 614 is a new cationic urea - formaldehyde resin of exceptional efficiency designed for addition to the paper pulp prior to formation of the paper on the wire. The product is available in commercial quantities. It is now being used commercially by several mills with outstanding results shown in a wide variety of pulps including unbleached Kraft. Increased dry strength, improved sizing and reduction of surface fuzz are among the paper improvements in addition to the wet strength produced.

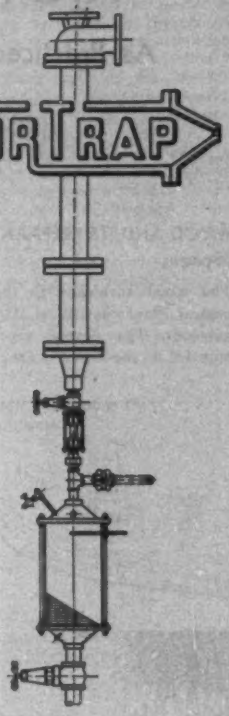
A Non-Foaming Size

Foaming troubles have long been a source of nuisance and trouble to paper makers. For several years Cyanamid has offered light colored rosin sizes which have been treated in the course of manufacture to minimize the production of foam in the paper mill. This principle has now been extended to darker grades of size and two new products are offered, viz. Paper Product 2274, a liquid size, and Paper Product 2284, the corresponding dry grade. These products are applicable to all types of furnish where the lower priced dark rosin sizes are currently being used. They are handled in existing equipment in a similar manner to ordinary rosin sizes. The reduction of foam through the use of these materials not only tends to increase the sizing efficiency but also aids in producing an improved paper through reduction of the commonly known foam problems. The products are commercially available.

THERE IS NO SUBSTITUTE FOR EXPERIENCE

Repeat Orders Prove:

There is nothing better than a VORTRAP



Over 265 Mills in the United States are satisfied users.

72.7 Per Cent of these have REPEATED their Vortrap orders.

1 company has purchased over 500 Vortraps

7 companies have purchased over 100 Vortraps each.

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Kraft Semi-Chemical Pulping

As Practiced at the National Container Corp. of Wisconsin Tomahawk, Wis.

K. E. Olson and W. W. Marteny

Chief Chem. and Tech. Dir. Respectively of National Container Corp.

I WOOD AND ITS PREPARATION

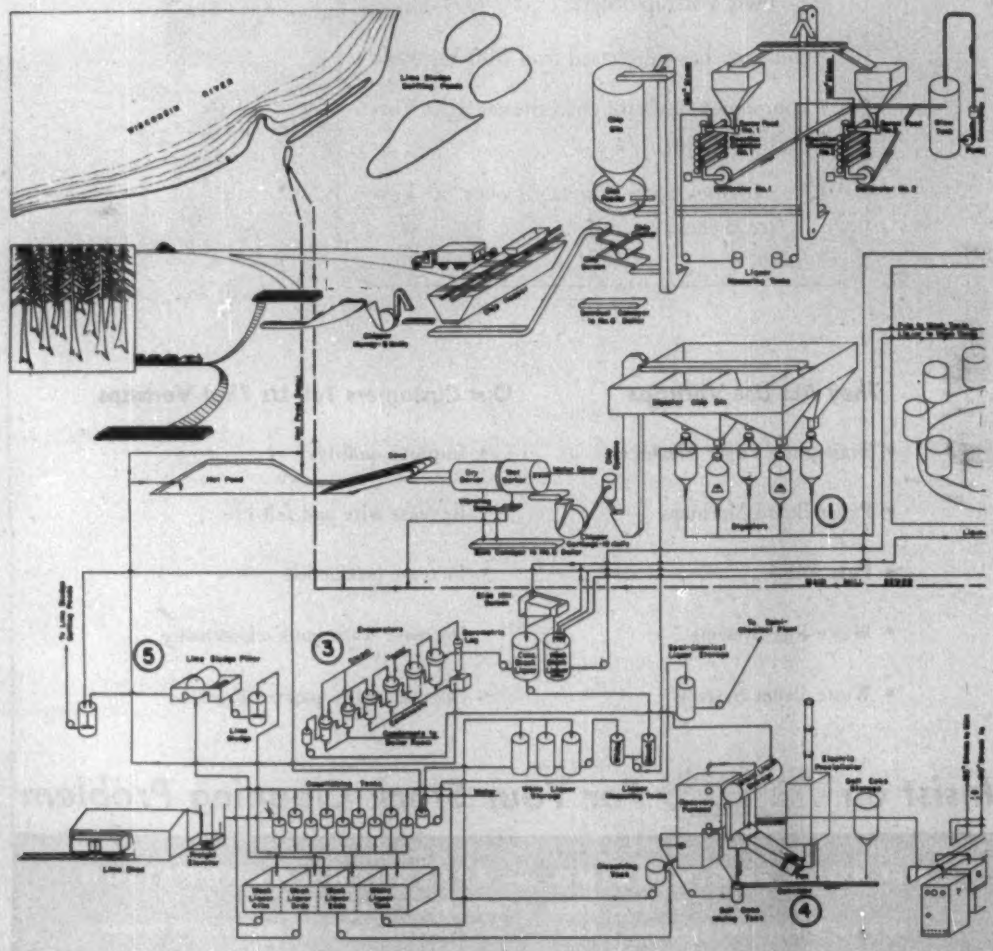
A. Species

The wood furnished to the Semi-Chemical Plant consists of 100 percent hardwoods. The normal species, encountered in the forests, are: Poplar, birches, maples, elm and ash. Poplar is handled separately, except during periods in which our portable chipper is operating.

B. Woods Operation

Wood is furnished to the Semi-Chemical Plant in the form of logs and also as chips purchased or made with our woods chipper.

The logs that come to the mill on cars and trucks are unloaded on a 125-foot concrete apron. Through the center of this apron is a ground level chain log conveyor which carries them to the chipper.



Flow Sheet of Complete

The chipper is a Murray 8-knife, 100-inch machine that operates at a speed of 270 rpm and is powered by a 252 HP, 390 rpm electric motor. These chips are conveyed to the shaker screens by means of a 16-inch diameter, 18-foot long, screw conveyor and a 24-inch wide belt conveyor.

The purchased or woods chips are fed from a large hopper by means of a slow-moving conveyor which intercepts the belt conveyor at the junction of the screw conveyor and the belt conveyor. This arrangement permits the use of chips from the Yard Chipper or of pre-chipped wood from trucks or cars.

We have two 5-foot TY-ROCK (W. S. Tyler Co.) vibrating chip screens in series. These are separated by a No. 3CS Mitts & Merrill hog with a capacity of 3,000 pounds per hr. This hog is placed so the oversized chips from the first top screen must pass through it onto the second screen. Both screens are equipped with 1¼ inch mesh top screen and Type F600 bottom plates with ⅛ inch holes.

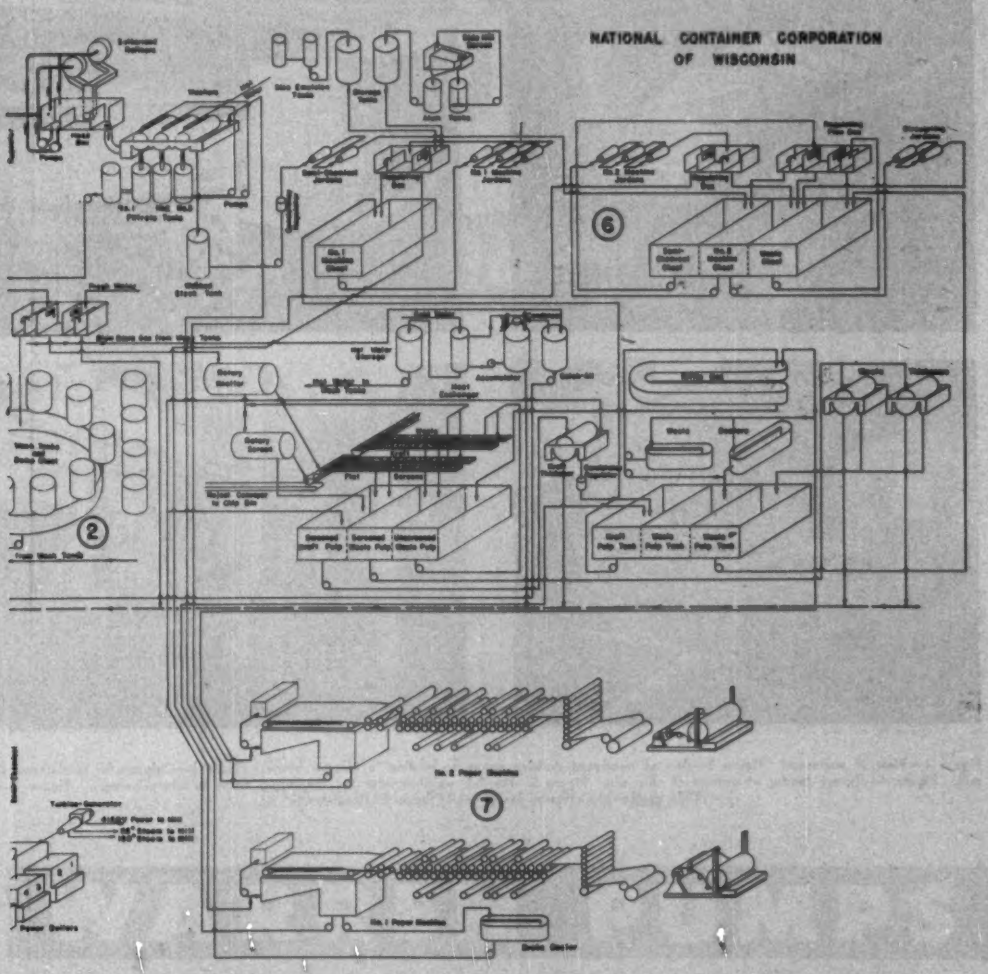
A Jeffrey bucket elevator takes the chips from the screens and conveys them to a 30-inch belt conveyor which, in turn, conveys them to the top of the chip storage silo. The fines are taken by chain conveyor to the Boiler Room.

The chip storage silo is made of reinforced concrete. It is 30 feet in diameter and 60 feet high with a cone bottom. The chips are fed from the bottom of this cone by means of a 12-foot diameter Stephens-Adamson disc feeder. In order to insure a steady flow of chips to the feeder, an arch breaker was installed. This arch breaker consists of an 8-inch iron pipe, 20 feet long, that is fastened at one end to the center of the feeder disc by means of a universal joint and extending upwards into the silo. As the feeder disc rotates, the arch breaker rotates with it, breaking down any arches that have formed in the chips and permitting them to flow, easily, to the feeder.

This silo has a capacity of about 150 cords of wood, which is sufficient to run the plant for over a day.

From the disc feeder, the chips are conveyed by means of a belt conveyor, screw conveyor and a bucket elevator to a point where the chips are divided. Part of the chips go to one weightometer, which feeds into a feed hopper for one Asplund unit, and part of the chips go to another weightometer for another unit.

The weightometer is a 20-inch, pivoted type S, with a maximum capacity of 12.47 tons per hour. It is manufac-



Operations at Tomahawk

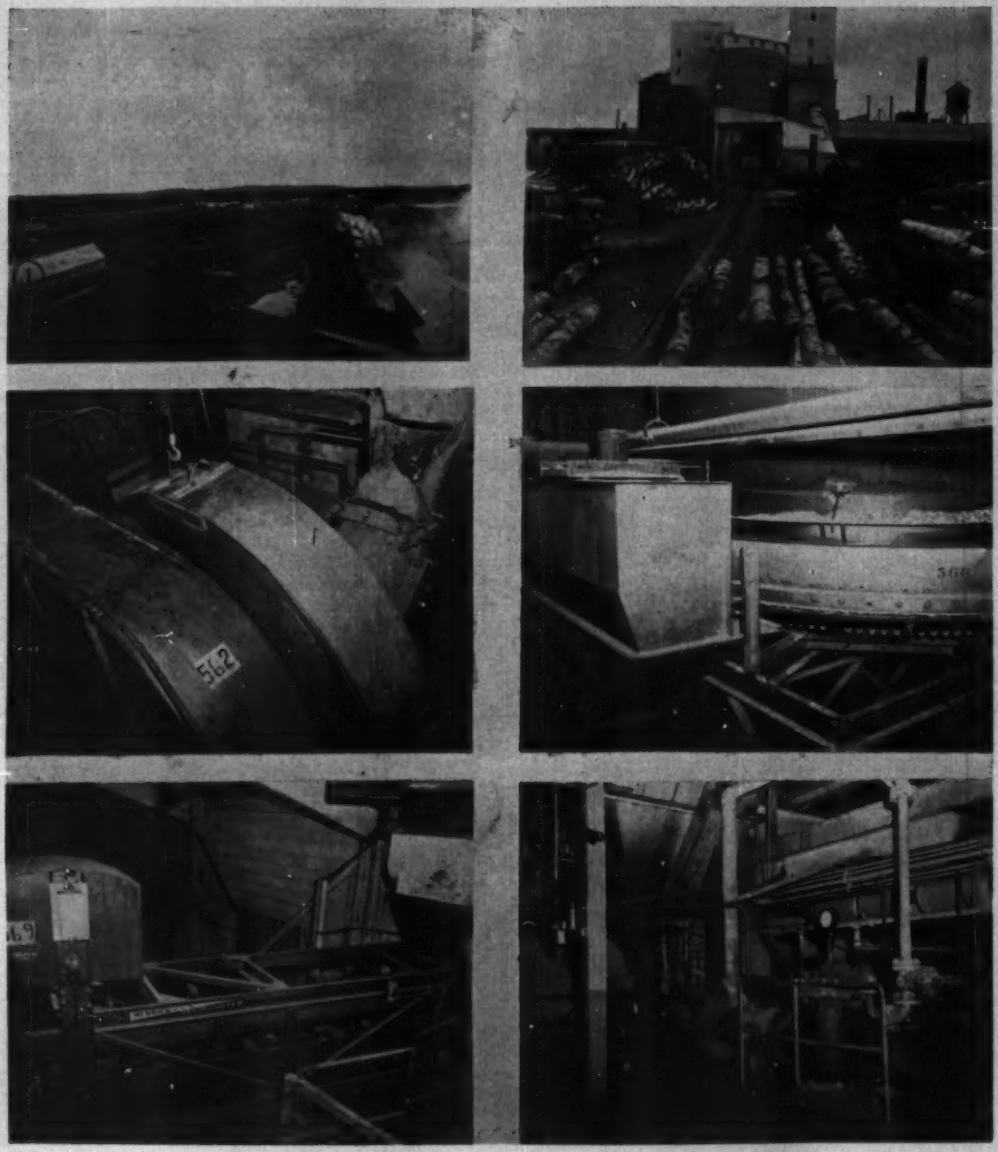


Figure 1—View of woodyard. Figure 2—Part of woodyard showing conveyor leading to chipper house. Figure 3—Chipper for semi-chemical mill. Figure 4—Rotary feeder at bottom of chip silo. Figure 5—Merrick weightometer for measuring chips to chemi-pulpers. Figure 6—Chip hopper and pressure feed inlet at top of chemi-pulper.

. . . in other words, not "off the shelf" because many of the stock handling problems of present day mills cannot be met by the use of standardized stock pumps. Interchangeability and economical production of parts, yes, but other than that it has been our policy over the years to consider each stock pump job as a separate engineering problem.

All factors are taken into consideration and then recommendations are made only on the basis of the best pump to accomplish the work to be done. It may cost a few extra dollars but this is compensated for many times over by dependable, low cost operation in any long range evaluation.

Proof that Warren engineering, design and construction meet the unqualified approval of pulp and paper mill authorities . . . proof that in actual operation, under widely diversified conditions, Warren Pumps will live up to efficiency and economy claims, is evidenced by the high percentage of repeat orders. Why don't you, too, put your stock handling problems up to Warren?

SEND FOR WARREN STOCK PUMP BULLETINS

PP-13

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS

Figure 7—Concrete chip storage silo. Figure 8—Part of chemi-pulper unit with asplund defibrator at bottom.

tured by the Merrick Scale Co., Passaic, N. J.

The chip feed hoppers have a capacity of 900 cubic feet or about 3.8 cords of wood. This is sufficient to run the Asplund unit for a short period, should there be any temporary interruption in chip flow.

Magnetic pulleys are used on belt conveyors to remove tramp iron from the chips wherever this is practical.

With the exception of chips made from veneer bolts, all chips are made from unbarked hardwood pulpwood or slabs. When buying chips from several sources, it is important that the chips be of approximately the same general size. When feeding chips which are too small to the Asplund chip screw feed, the chips will pack, causing the screw feed motor to become overloaded. If the chips are too large, they will not be packed enough by the feed screw and you are apt to have blowbacks. Excessive fines in the chips will also cause blowbacks.

TABLE I

CHIP ANALYSIS

Average Composite Chip Analysis of Chips Made from Round Hardwood Pulpwood

	Retained on 1" mesh—	8.1%
Through 1"	Retained on ½" mesh—	24.1%
Through ½"	Retained on ¼" mesh—	31.1%
Through ¼"	Retained on ⅛" mesh—	35.2%
Through ⅛"		1.5%
Moisture		46.0%
Weight per cubic foot		18.5%

II LIQUOR PREPARATION & HANDLING

We use our regular kraft white liquor, made in the kraft pulp mill recovery, for cooking the semi-chemical pulp.

Because our semi-chemical process is a continuous process and our kraft liquormaking is a batch process, we trim all our liquor to the same strength. By so doing, we are better able to maintain uniform conditions in the cooking process.

The white liquor is trimmed, with water, from a strength of 0.85 to 0.90 pounds active alkali as Na_2O per gallon to 0.569 pounds per gallon. This is done in a 7500-gallon tank equipped with agitator. After trimming, the liquor is retested and pumped to a large storage tank. From this storage tank it is pumped to the chemical feed tanks in the Semi-Chemical Plant, as needed. From the feed tank, it flows through a Fisher-Porter flowrater to a variable stroke Milton Roy pump, which pumps it into the Asplund reaction chamber.

By this method we are able to obtain very clean and uniform cooking liquor.

III PULPING

A. Equipment

The pulping equipment consists of two 24" OD 6 pipe one-way flow B-X Special reaction chambers with down pipe and Type D Asplund defibrators.

Variable speed DC drives are used both on the feed screws and the screw conveyors in the pipes. The feed screw is driven by 50 HP; the screw conveyors by 10 HP. The Asplund defibrators are driven by 250 HP, synchronous 1200 rpm motors.

B. Process Variables

In our kraft semi-chemical process, we use about 1,800 pounds of 170 psig steam per ton. Kraft white liquor is added in sufficient quantities to yield a pH of the blow stock between 6.0 and 7.0. This amounts to approximately 3.0% Na_2O, based on the oven-dry wood.

Although the reaction time is variable, it is tied quite closely to the rate of production. Consequently, we use a time in keeping with the maximum demand. This is between 12 and 13 minutes.

The volume of liquor used amounts to about 120 gallons per cord of wood, which is enough to yield pulp of 50% consistency.

C. Nature of the Blow Stock

The stock after the defibrators is coarse and consists of a large amount of hard fiber bundles. A typical fiber classification of this stock is:

TABLE II

SCREEN ANALYSIS OF BLOW STOCK

On 10 mesh	56%
On 20 mesh	4%
On 35 mesh	3%
On 65 mesh	3%
Thru 65 mesh	34%

Chemical analysis shows about 20% lignin, 60% holocellulose and 20% material soluble in water and alcohol-benzene.

The results of laboratory beater evaluations show several of the peculiarities of the stock from a papermaking viewpoint. The bursting strength develops in a normal manner, rising quite rapidly to a maximum and then decreasing. The tearing resistance, unlike conventional pulps, develops much like the burst. It increases with beating to a maximum and also falls off. These qualities are illustrated by these results:

TABLE III

BEATER EVALUATION—BLOW STOCK

Beating Time	Freeness	Burst	Tear
0	710	5	34
5	600	13	45
13	360	42	57
25	70	48	48

The pulp after the defibrators is stored in an agitated tank ahead of the refiners. The liquid, used to dilute the stock in this tank, is filtrate from the washers. The temperature is 200° to 210° Fahrenheit. It is quite possible that some additional pulping action occurs during the soak in this hot liquor.

IV REFINING

The defibered stock is refined in two 48" Sutherland refiners operating in parallel. Each refiner is driven by a 300 HP, synchronous motor.

Each refiner is provided with a circulating pump of such capacity that it is possible to re-circulate the stock five to six times.

The consistency of the stock is regulated with a pressure type DeZurick regulator at 4.5%. The temperature of the brown stock, at this point, is between 200° and 210° Fahrenheit.

The action of the refiners is mainly one of defibering the softened bundles, with little other action. This is shown by the high freeness of the stock—about 700 cc.

Refined stock will develop in the laboratory beater in much the same way as the blow stock. Maximum values of the burst and tear are generally higher than obtained with blow stock. The action of the refiners is illustrated by screen analysis.

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TABLE IV

SCREEN ANALYSIS ON STOCK AFTER REFINERS

10	2.3
20	7.3
35	16.2
65	39.5
Thru 65	34.7

V WASHING

A three stage 8' x 10' *Impco* countercurrent vacuum filter is used for washing the pulp.

Pulp enters the first vat directly from the Sutherland refiners after being diluted from 4.5% to 1% consistency with No. 1 strong filtrate. The usual countercurrent washing is followed using warm spray water on the last or No. 3 cylinder. From 40 to 80 gallons per minute at 100°F. has been found to give sufficiently clean pulp for our purpose. The pulp leaves the last washer at 15% consistency and is diluted to 4% with white water from the paper machine.

For a short period of time, we bypassed the washers entirely. The unwashed stock was pumped directly to the paper machine chests. At the same time, the paper machine white paper system was closed as much as possible. The excess white water was pumped back to the Semi-Chemical Plant for blow stock dilution.

This arrangement gave the paper machine and semi-chemical a completely integrated and almost completely closed white water system. It had several advantages including increased yield, increased rigidity and no waste liquor disposal problem. It was discontinued, however, because the board retained an odor which, although not offensive, was quite noticeable.

VI WASTE DISPOSAL

We try to keep all our waste liquor out of the sewer and we believe we are doing a good job. Except for occasional spills, due to infrequent abnormal operating conditions, we do not put any waste liquor in the sewer.

As was mentioned before, our pulp is washed on a three-stage countercurrent *Impco* vacuum filter. The overflow of strong waste liquor is sent to kraft mill, where it is used for the first wash in the kraft wash tanks.

The semi-chemical waste liquor contains about 6% solids and has a temperature of about 170°F. When it is mixed with weak kraft black liquor, it makes a good washing agent. The only problem that we have had in using this mixture for washing kraft pulp arises from the formation of a precipitate if the pH of the mixture drops below 10.3. However, if the pH is held above this value, all the semi-chemical waste liquor can be used to advantage and with little difficulty.

TABLE V

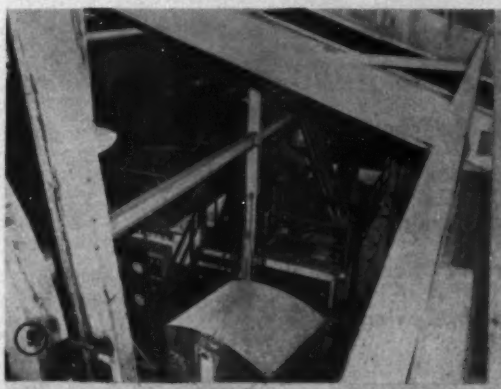
SEMI-CHEMICAL WASTE—KRAFT BLACK LIQUOR MIXTURE

The Effect of pH on Drainage Rate

ML. Kraft B.L.	ML. S.C. Waste L.	pH Mixture	Drainage Time
150	0	11.2	10 sec.
100	50	10.8	16 sec.
75	75	10.0	1 hr. 24 min.
60	90	9.8	16 hrs.
30	120	8.6	24 min.
10	140	6.0	14 min.
0	150	5.5	15 sec.

VII STOCK PREPARATION

The washed stock at 4.0% consistency is pumped to the Beater Room. It passes through two Jones Majestic jordans in series and is stored in a



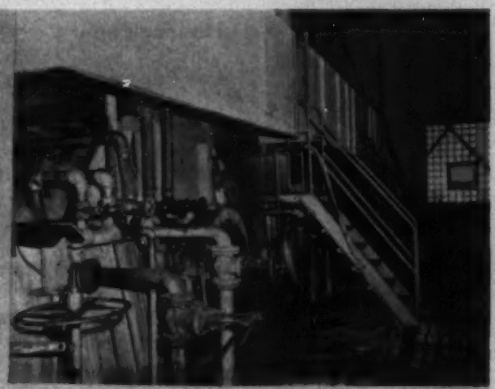


Figure 9—Sutherland refiners, used for treating stock from chemi-pulpers are shown in background. Figure 10—Three stage Impco vacuum washer in semi-chemical mill. Figure 11—Instrument and control board for semi-chemical mill located in washer room. Figure 12—Paper machine room showing Fourdrinier producing corrugating board from semi-chemical pulp.

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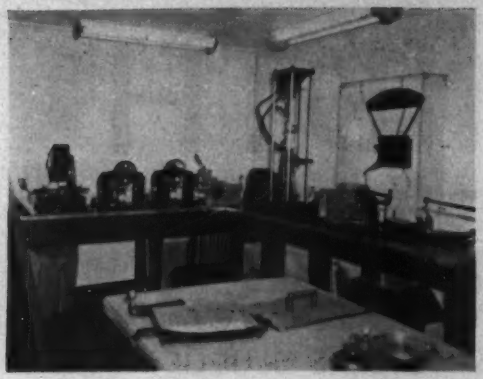


Figure 13 — Paper testing laboratory.

chest. The freeness of the stock, after these jordans, is about 600 cc.

The stock is pumped to a metering box, where it is mixed with waste, and passes to the machine chest. The stock in the machine chest is circulated through two Jones Majestic jordans in series.

There are three Shartle Miami jordans ahead of the machine. The four Jones jordans are driven by 400 HP motors and the three Shartles by 350 HP motors. The freeness at the stuff box, ahead of the machine, is held between 350 and 400 cc.

Waste paper is pulped in a Dilts and a Niagara beater, equipped with perforated backfalls for continuous operation. The stock is riffled to remove grit and impurities, screened and then thickened. The consistency of the thickened stock is held at 4.0%.

VIII PAPER MACHINE OPERATION

The semi-chemical stock is made into corrugating medium on a Moore & White fourdrinier with a 156" wire, widest trim 142". There are two suction presses ahead of the dryers. The dryer train contains 38 dryers. One calender stack is used.

The machine is driven by a General Electric 400 HP steam turbine. The maximum speed is 730 feet.

In normal operation the consistency in the head box is 1.0%, the temperature is between 110° and 120°F.

The sheet weighs 26 lbs. per M Sq. Ft. The strength properties are:

TABLE VI

Mullen	32 — 37
Tear MD	60 — 70
Tear CD	80 — 90

The authors express their appreciation to the National Container Corporation of Wisconsin for their permission to publish this work.

Modernization At Hollingsworth & Whitney Waxing Division

Under the able assistance of H. & W.'s personnel both from management, engineering and manufacturing departments, Dilts Machine Works, Division of The Black-Clawson Co., undertook to build a single modern high speed versatile waxing machine to replace a battery of old-fashioned waxing machines which had been in use for a considerable period of time at the Waxing Div. of Hollingsworth & Whitney Co., Waterville, Maine.

The machine as conceived and executed is streamlined, rugged, extremely flexible, easily controlled and capable of wet waxing at 1500 feet per minute, dry waxing could be done 2000 feet per minute. Actually from a mechanical standpoint the machine could run over 3000 feet per minute.

Incorporated in the machine's operational flexibility is its capability of running dry wax paper, wet wax paper, the latter can be dipped in the especially designed Howard water tower imparting a high gloss to the sheet.

The whole machine can also be used as a laminator for many dissimilar types of materials.

The new machine has the following features:

1. A Kohler constant tension, single unwind shaft type running belt unwind stand paying out or holding back the sheet at any predetermined tension, both held and controlled throughout the complete operation cycle.

2. A two roll waxing section, roll nip clearances being adjustable to .001" and held constant, clearances are also repeatable.

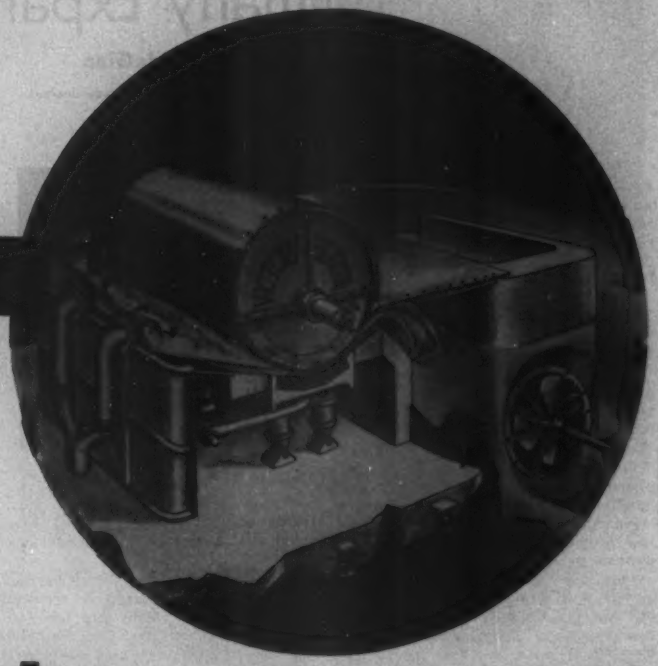
3. Two hot rolls, one directly ahead of the two roll machine and one directly following it.

4. A three roll waxing head, the controls exactly the same as in the previous two roll waxing head.

5. A polishing section for wet waxed sheets running a 100 percent paper speed but in the opposite direction.

Figure 1—Dilts High Speed Waxing Machine

Controlled Flow across full face!



EXCLUSIVE FEATURES OF THE VICTORY BEATER

1. *Controlled Flow — uniform, positive fibrillation*
2. *Pressurized bedplates*
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5. *Highest effective inch cut potential*
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11. *Highest quality, high tonnage production*
12. *All-time record for continuous production!*

VICTORY BEATERS are made in two styles: (a) Single Roll units for handling batches as small as 500 pounds. (b) Multi-Roll units with two, three or more rolls for treating 100, 150, 200 or more tons per day on a continuous production basis.

All the facts are available for your examination. Write, phone or wire today for complete information. Ask for Booklet.

IN the *Controlled Flow* VICTORY BEATER* the roll has one function only: *to treat the stock.* To assure uniform, positive fibrillation, the roll is fed only the exact amount it can treat in one pass. This stock is spread in an even film across the entire roll face — *exclusive* deflectors preclude stock starvation in any area — and squeezed up to 40 tons pressure by the hydraulic bedplates centralized under the roll. There is no superior method.

The *Controlled Flow* VICTORY BEATER saves power up to 35% over any other known beating or refining equipment on equivalent papers, and raises both quality and volume of production.

*Patents issued and pending.

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6. A water finish tower imparting a high gloss to the wet waxed sheet with two banks of 12 stainless steel knife blades for water removal.

7. An angular cooling section consisting of two 24" diameter rolls made of centrifugally cast bronze.

8. A single shaft type center rewind with special bearings for squaring. Bearings are self-locking to prevent them from flying open.

9. Especially designed squaring rolls are strategically located for web control.

10. Complete finger tip control of the pneumatic as well as the electrical system.

11. A complete Reliance VS electrical drive with re-generative power on the unwind stand and holdback system. Each section is individually powered, interesting to note that each of the 24" cooling rolls are individually motored.

This waxing machine control system in concept embodies all of the most modern and up-to-date equipment, both from the electrical, pneumatic, cooling and heating standpoints. They are simple to operate, changes can be quickly made thus eliminating to a minimum down time.

The flexibility and adaptability of the machine plus the extreme controllability of the all electric drive providing exact operational data makes this installation a unique set up, more than meeting all of our customer's requirements.

Thilmany Expands

E. P. McGinn

Industrial Editor Paper Trade Journal

The Thilmany Pulp and Paper Co. at Kaukauna, Wis. has kept its mill up-to-date by a steady program of replacement and modernization. However, during World War II, it was necessary for most civilian industry to defer modernization programs.

Since the end of World War II Thilmany, like some others in the industry has been trying to make up for lost time.

Most of the improvements up to the middle of 1950 have been previously reported but since that time some projects have been finished and others started and some are still underway.

One of the projects recently completed is the remodelling of the wood handling system. This system had not been changed since 1928 although the mill production had been increased 50 percent over that period.

One of the important features of the new wood handling system is the hot pond which consists of two concrete lined channels each 250 ft. long, 25 ft. wide and 8 ft. deep. The water flow rate is 7000 GPM, about 1500 of which is gravity flow, with 5500 GPM being supplied by circulating pumps.

The two channels can be used to handle two different species of woods or one channel may be used for peeled wood and the other for rough wood.

Wood Supply

Wood for the mill is obtained from three different sources as follows: 60 percent from Canada, 30 percent from Montana and 10 percent from the Lake States. Wood from Montana is lodgepole pine whereas that from Canada or the Lake States is usually a mixture of Jack, white and red pine, spruce and balsam.

Wood may be fed into the hot pond channels directly from cars or

T. T. Collins, Jr.

trucks or it may be reclaimed from woodyard storage and put in the pond by crawler cranes.

All of the wood now being handled is eight feet long. Logs are removed from the pond by means of a jack ladder which carries them up to chain conveyors where the rough wood goes to the barking drum and peeled wood goes to the chipper. All of the conveyors were built and installed by Link-Belt Co.

The new barking drum was built by Fibre Making Process Co. and is 12 feet in diameter by 45 feet long.

So far as is now known, Thilmany is the only mill in the U. S. dry barking eight food wood in a barking drum. The drum is rotated through a reduction gear at 7 RPM by a 200 HP motor.

As the logs discharge from the barking drum they are washed by a shower and then dropped to a short belt conveyor which carries them to a jack ladder where they are raised to the chipper loading level. Another belt conveyor then takes them to the O. J. Murray, 88 inch, ten knife chipper.

The chipper disc is driven directly at 360 RPM by a 600 HP synchronous motor. Chips are blown into a cyclone from which they drop to a belt conveyor that carries them to pair of D. J. Murray level deck vibrating chip screens. Each screen is five feet wide by 14 feet long, and is driven by a 7½ HP motor through an eccentric vibrator drive. Accepted chips are carried on belt conveyors and a bucket elevator to the chip bins. Oversize chips are put through a 36" four knife chipper used as a re-chipper. Reduced chips from this unit are returned to the system.

Paul West
Pulp Mill Supt.

Pulp Mill

A part of this mill that has received an appreciable amount of attention is the pulping equipment. The digesters have shown an excessively high rate of corrosion for the past few years and have been the subject of an extended study to determine if possible, the cause of the corrosion and also to find out the best methods for correcting it. After considerable study it was decided that lining with welded

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Figure 1—Hot pond in foreground with wood storage and water tank in background. Figure 2—Both channels of hot pond may be seen in center with pulp in cars and in yard storage at rear. Figure 3—Jack ladder for carrying eight foot logs from hot pond to barking drum level. Figure 4—Barking drum filled with eight foot wood. Figure 5—D. J. Murray, 88 inch ten knife chipper. Figure 6—D. J. Murray level deck chip screens, side view.

Figure 7—D. J. Murray, level deck chip screens, top view. Figure 8—Spare digester being lined with inconel plates. Figure 9—New 9x16 Swenson-Nyman washers being installed as building construction proceeds. Figure 10—Tile stock chests under construction in pulp mill. Figure 11—Construction of addition to paper machine room. Figure 12—New building addition to power plant.

Figure 13—Addition to chip bins and digester house.

strips of Inconel offered the best solution to the problem. A description of the studies made, together with the method of lining, will be found in an article entitled "Inconel Lining of a Sulphate Digester" by "Tex" Collins and Steve Baisch, published in PAPER TRADE JOURNAL, Feb. 9 & 16, 1951.

The mill has four digesters in operation. All are of the tumbling type, 10 feet diameter by 30 feet in height. Each has a production of 40 tons of pulp per day.

A fifth digester is now being used for the re-lining jobs so there will be no loss of production. One of the relined digesters has been in operation for several months. The digester now being relined is one which has been out of service for several years and in preparing it for use, new trunnions and a cone are being installed. When all of the four operating digesters, as well as the fifth or spare unit, have been lined, the later will be mounted and placed in service. This will increase the total capacity of the mill from 160 to 200 tons per day, but by that time the new washer room, as well as a new recovery boiler rated at 250 tons per day, will be in operation.

Each of the digesters is 30 feet high, by 10 feet in diameter, has a volume of 1925 cubic feet, takes eight cords of wood, 4,000 gallons of cooking liquor, and yields 4½ tons of pulp. Cooking time is 1¾ hours but of course the full cycle of 2⅔ hours with each digester averaging about nine cooks per 24 hours. The digesters rotate end over end (or tumble) at the rate of one revolution every seven minutes. It is estimated at Thilmany that with tumbling digesters, 200 lbs. less steam per ton of pulp is required. Part of this saving is of course due to the use of less steam for cooking and part is due to the use of a smaller volume of more concentrated cooking liquor, with consequently less evaporation required for recovery.

Washing System

At the time of this writing the pulp is being washed in diffusers which will soon be replaced with the new vacuum washing system rapidly nearing completion. There are 16 diffusers, each 9 feet in diameter by 25 feet high. Each digester charge is blown into a diffuser, drained and washed for eight hours. Thus it requires four diffusers to take care of the pulp from each digester.

The new washing system, when completed, will include a blow tank capable of holding about 10 tons of pulp at 3½ percent consistency and a Swenson blow heat recovery system. Strictly speaking these units are not part of the washing system but nevertheless are, or at least the blowtank is, essential to the changeover from diffusers to vacuum washing.

The washers are located on the top floor of the new brown-stock building adjacent to the digester and diffuser rooms. The new building is 40 feet wide, 125 feet long and 70 feet high and is of steel frame concrete and brick construction.

All of the pulp washing will be done on three Swenson-Nyman vacuum washers, each having cylinders nine feet in diameter and sixteen feet long. Two of these washers are rigged for two-stage washing and the third is a single stage unit. The washers are arranged in tandem thus providing five stages of washing. Each of the five stages has its own seal tank located on the bottom floor of the brown-stock building.

For storage of washed brownstock, three steel tanks have been built beside the brownstock building. Each of these tanks is 30 feet in diameter by 40 feet high, with cone bottom and will hold more than 150 tons of brown-stock at 16 percent consistency.

Recovery Plant

Black liquor from the diffusers (or the washer seal tanks with the new system) is thickened in the Swenson five-body quintuple effect evaporator which was installed in 1945. This unit has 2" diameter stainless steel tubes in the first effect and 2" diameter and 20 feet long carbon steel tubes in the other four effects.

The heavy black liquor passes through a venturi scrubber where it is further concentrated before going to the B & W Recovery Furnace. This furnace is rated at only 150 tons per day and construction is now well under way on a new B & W Recovery Furnace rated at 250 tons per day and equipped with a Venturi scrubber capable of handling liquor at 61 percent solids. Steam will be produced in this boiler at 600 PSI.

A continuous causticizing system and a kiln 125 feet long by 6 feet in diameter complete the recovery system equipment.

Pulp Screening

Washed pulp is diluted to 4 percent consistency and then passed to the four coarse screens from which the rejects are returned to the digesters and the accepted stock flows to the three lines of flat screens. Accepted stock may then travel by any of three routes as follows. About 50 tons per day of accepted stock goes to a thickener and is then sent as slush stock at 40 percent consistency to the screened stock chest from where it is pumped to the paper machines as needed. A second portion (about 40 tons a day) of the accepted screened stock flows to four wet machines which make it into wet laps which have a maximum dryness of 40 percent pulp and 60 percent water. The third portion, normally 70 tons of the 160 tons per day total, is sent to the bleach plant. Of course, the proportions of the pulp sent over each of the above routs is only approximate and will vary with conditions and requirements.

Pulp Bleaching

The bleach plant is a two stage batch system consisting of chlorination and hypochlorite steps. The chlorinator holds three tons of stock at 5 percent consistency. Gaseous chlorine is added and allowed to exhaust on the pulp after which the hydrochloric acid is neutralized with lime. After being washed, the stock passes to the two Bellmer type bleachers, each holding six tons of stock at 8 percent consistency. The stock may remain in the bleachers from one to four hours depending on the grade and brightness of the pulp desired. The bleached stock goes to a vacuum washer and then to wet machines where it is made into 40 percent dry wet laps for storage.

The following grades of pulp are produced to satisfy the quality requirements for the wide variety of papers manufactured in the paper mill.

"A" pulp is a kraft pulp that is normally prepared for kraft papers. It is a pine pulp, and receives the "rawest" cooking of Thilmany pulps.

"B" pulp is a softer cooked pulp with more of the lignin removed. It is usually bleached or may be used unbleached in certain kraft specialty papers.

"C" pulp, which is used for amber glassine grades, is the softest cooked pulp.

"Envelope" pulp is similar to "A" pulp, and is used for envelope paper. It receives the same cooking as "A" pulp, but it is made from the best wood (Canadian Jack Pine) available and receives more careful washing and screening.

"Carbonizing" pulp used for carbonizing paper that is manufactured on No. 10 paper machine, is similar to "B" pulp. It uses a better grade of wood, however, and receives more careful screening and cooking.

"Bleached No. 5" pulp is bleached

pulp of the lowest brightness. It goes through a single stage bleaching process, using only calcium hypochlorite.

"Bleached No. 7" pulp goes through a two-stage bleaching process. The first step is chlorination, from where it goes to the second stage, using calcium hypochlorite.

Paper Mill

There are seven paper machines at Thilmany with the eighth now being installed. Machines one and two produce glassine and greaseproof. Numbers six, seven, eight, and ten make machine glazed paper and number nine produces machine finished grades. The new machine will be number eleven and will be used for the production of glassine and greaseproof. It is apparent that there are no number three, four, or five machines.

During the year 1950 a total of 59,000 tons was produced on all machines. The total number of working days was 323 and the total average daily production was approximately 183 tons. Although a small percentage of paper from all machines is sold directly to customers, most of it is processed in Thilmany's own converting plants.

Finishing and Converting

In addition to the usual finishing department, the following converting departments are in operation at Thilmany; supercalender, asphalt, waxing, printing and decorating departments and the bag plant.

In the supercalender department, both kraft and glassine are dampened and then supercalendered to make bags, wrappings or packagings for cakes, cookies, potato chips, meats, ice cream, etc.

The asphalt department operates six asphalting machines that produce a wide variety of protective papers such as furniture wrap, "Diamond Mesh" reinforced papers, Signode grain doors for freight cars, moisture vapor proof wrapping, foil laminates, Kimsul batt lining, etc.

Five different grades of asphalt as well as light colored elastomers are used as laminants or coatings to produce the characteristics required for the various specialty products being manufactured.

The waxing department produces a variety of waxed papers including waxed glassine bread wrap, meat wrap, household waxed paper, etc.

The bag department produces a variety of bags made from glassine, waxed glassine, MF kraft grocery bags, MG kraft specialty bags.

The printing and decorating department takes care of the art work, preparation of printing plates and rolls, blending of inks etc. for all of the printing and decorating on Thilmany converted papers.

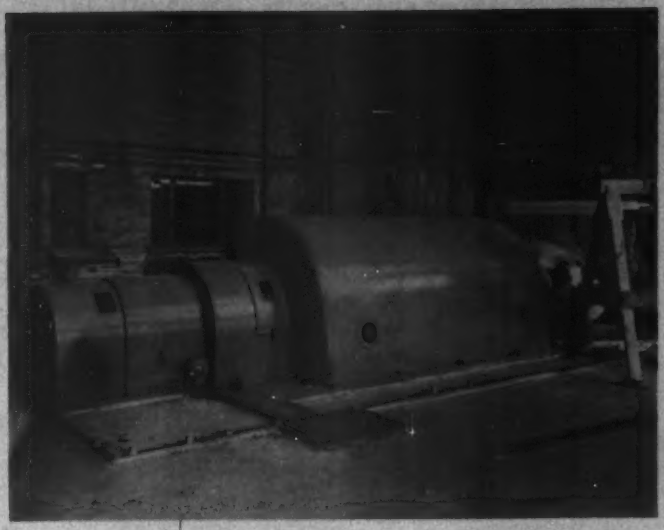


Figure 14—New General Electric 6000 KW turbo-generator.

Power Plant

Another project that is now nearing completion, is the new turbine room and turbo-generator. The turbine room is an addition to the existing power plant. The new part is 125 feet long by 40 feet wide. Like the new brownstock building, this is also a steel, concrete and brick structure.

The turbine is a General Electric 6000 KW unit designed to operate at 3600 RPM from steam at 600 PSIG, 700° F and generate 3 phase 60 cycle AC at 12,000 volts. In radial distribution load centers, the 12,000 volts will be reduced to operating voltages of 2300 and 440.

One B & W power boiler was installed in 1949. This unit is capable of producing 90,000 lbs. of steam per hour at 600 PSIG, 700°. It is coal fired with a Detroit Rotograte stoker.

List of Suppliers

Barking Drum 12' x 45, Fibre Making Process Co.
Fourdrinier, Beloit Iron Works.
Inconel Digester Linings, International Nickel Co.
Paper Machine Hood & Vent. System, J. O. Ross Eng. Co.
Recovery Furnace (under Constr.) Babcock & Wilcox Co.
Turbo-Generator, General Electric Co.
Three 9x16 Vacuum Washers, Swenson Nyman Co.
Wood Conveyor, Link-Belt Co.
Barking Drum, Fiber Making Processes, Inc.
10 Knife Chipper, D. J. Murray Co.
4 Knife Rechipper, D. J. Murray Co.
Chip Screens, D. J. Murray Co.
Blow Tank, Northeastern Boiler Co.
Jenssen Knot Screens, Bird Machine Co.
Brown Stock Washers, Swenson Evaporator Co.
Brown Heat Condenser, Swenson Evaporator Co.
Pumps, Allis-Chalmers.
Instrumentation (Colorgraphic Panel), Brown Co.

WHITING-PLOVER DAM

Construction on a new dam was started the middle of July at the Whiting-Plover Paper Co. located on the Wisconsin River in Stevens Point, Wis.

The dam will be of concrete construction and will be approximately 700 feet in length. This new dam will replace an old one which has been standing for almost 60 years. Work is expected to be completed by December of this year.

C. R. Meyer and Sons, Oshkosh, Wis. are the contractors.

Expansion '51 '53?

Back in the dim past — 1945-48, when the Paper Industry completed its all-time peak of expansion, many viewed with alarm the possibilities of a flood of paper coming on the market. The only gamble was on the "Big If" of general business. Would it continue upward or slump? The "prophets of doom" said "slump, it would be." Surprising enough, it did not happen.

The new capacity was easily absorbed, primarily because of good general business. Moreover, increasing new uses also contributed in no small measure.

Forgotten, however, was the factor that little or no new construction occurred during the war years, making our normal capacity increases impossible. In fact, only by super-human efforts was the production maintained during the War, for generally, the industry was given little consideration as compared to the metal producer and fabricating industries.

That War moves on an ocean of paper was little realized by government planning boards!

Here we are, now, faced with danger at many points, any one of which may be the real thing again. Once again, we are preparing to defend ourselves, at stupendous cost and super-human effort. The Paper Industry is preparing to expand to take care of either the continuing civilian growth, or War, if the Russians so choose.

Expansion Exceeds $425 Million

The Certificates of Necessity issued to August 1 tell only a part of the expansion story. There are mills expanding or modernizing without certificates, and there are others having certificates who, for one reason or another, will not use them. There is still a third class which was nearly ready to produce when the certificates were granted, and now have been in production some months.

Some $425 million had been granted up to August 1, when the moratorium took effect. To this may be added certificates granted to "fringe" paper industry companies, and for chemical plants to be built as parts of paper companies.

A rough calculation would show that, between 1951 and 1953, some three million tons of pulp and paper will be available above the current productive capacity of about 26 million tons. Thus, if all present plants with Certificates of Necessity are completed, the annual capacity would not be far from 30 million tons.

Plans for Production

The new construction will primarily produce packaging materials. Some one-half of this tonnage will be kraft liner and corrugating. Multiwall sack will be the next largest item, followed by various other boards, papers, and specialties. There should be some one-million tons of various types of market pulp, of which a major portion will probably be in the dissolving grades.

Chart I — shows capital improvements expenditures within the industry during certain years, and the growth of production during the same years.

For the certificates issued to date, Table I shows the magnitude of the plans by companies.

Map I—shows geographic distribution of this our greatest expansion. (The South has the greatest expansion, of course, following the current trend. It is interesting to note, however, the improvements either underway or planned, in the Lake States.)

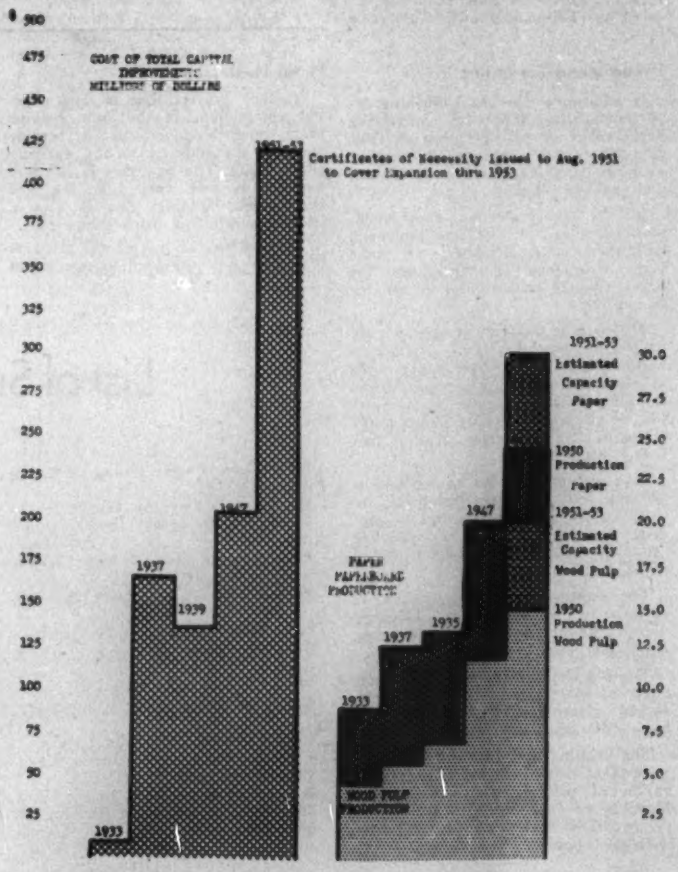
Major Headache is Machinery

There are many problems to be solved before these "paper" plans are actually in production. Manpower, engineering talent, and supplies are among them. *However, the major headache is providing building materials and the necessary metal through CMP.*

So far, we are only in the first quarter of allocations, and paper machinery manufacturers are at next to the bottom of the list in allocations of metal. It is reported that our machinery people got some 65 percent of what they applied for; and it is further reported that the next quarter it will be some 70 percent of the 65 percent. To date, it has been impossible to obtain the amounts of the specific allocations. *Appeals for relief, so far, have been rejected.*

It is reported that the current backlog of machinery orders is $160 million.

In talking with an outstanding au-



A Big Forward Step In The Measurement and Transmission of Flow

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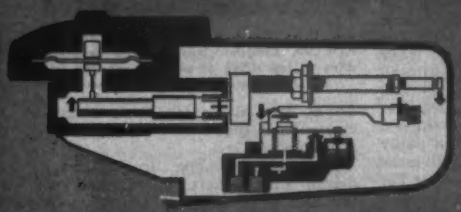
BROWN DIFFERENTIAL CONVERTER

(pneumatic-balance flow transmitter)

Easy Field Calibration –without water column

No Strainers Required



Functional schematic cross-section of the Brown Differential Converter . . . showing its utilization of the pneumatic-balance principle

Easily Cleaned

Wide Rangeability –in one unit, 20 to 200" H_2O

Fast Speed of Response

Easy to Install

No Mercury or Seals

AFTER long and rigorous testing in the field, the Brown Differential Converter is ready to set new high standards of simplicity and precision in the measurement and transmission of flow.

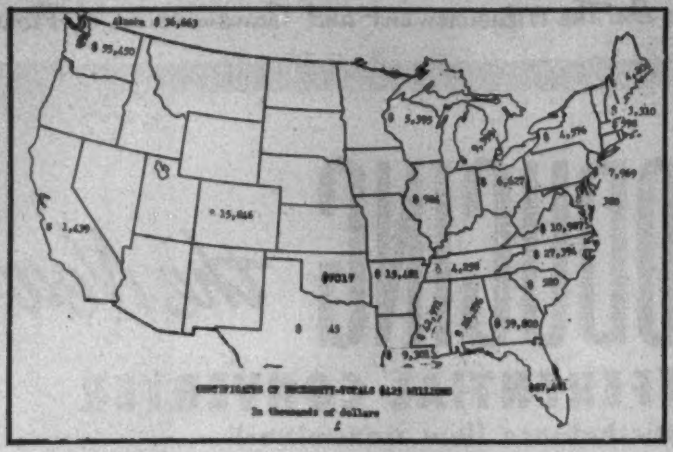
Operating on the pneumatic-balance principle, this compact and lightweight unit converts differential pressure at the orifice into a proportionate output air pressure which is a measure of flow. Range is continuously adjustable, from 0-20 to 0-200 inches of water. All adjustments are easily and simply made, without special tools or extra parts.

Applicable to a wide range of continuous processes, the Brown Differential Converter is the forerunner of an entirely new series of pace-setting developments made possible through Brown *Creative Instrumentation*. For detailed information write for a copy of new Catalog 2281 . . . and call in our local engineering representative for a discussion of your process needs. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

MINNEAPOLIS-HONEYWELL REGULATOR Co., *Industrial Division*, 4478 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS **Honeywell**

Brown Instruments



thority on C.M.P., it was pointed out to him that with all of the increased production, of nearly everything, sufficient wrapping and packaging material was equally necessary, and that World War II had furnished some bitter experiences because of lack of packaging. It was also emphasized that it takes as long to build a pulp and paper mill to provide new capacity, as a steel mill.

The question was then asked of him: "Is the top echelon in C.M.P. giving any consideration to packaging materials and pulp and paper." His reply was: "We have heard nothing about the need for additional pulp and paper facilities. Maybe no one has thought about it or told us."

From the results, it appears, no one is thinking about it. Or more important still, no one has put the "Importance of Paper" across to those who are doling out the metal.

Our Metal Requirements

What does the industry need in metal? The requirements to fulfill the Certificates of Necessity program are not available for publication. Nor are the facts on metal requirements for M.R.O. available. There is some doubt in the minds of some people, that they have ever been compiled.

Looking backward to 1941, a survey was made for W.P.B. to determine what was the minimum amount of metal required to maintain production of some 17 million tons of paper, plus 14 million tons of pulp, plus some 14 million cords of pulpwood. (Table II shows the compilation of the figures.)

It must be remembered that this consumption of metal was for M.R.O., and that there was no expansion of facilities. Since that time, we have increased our production 50 percent, and if the planned expansion ever takes place, at least 100 percent more would be required.

Why are we in this position? EVERYONE TAKES PAPER FOR GRANTED.

What must we do about it? It's very late, maybe too late; but, we have to sell the importance of paper—right now—and keep on selling it. Washington is a good place to start.

Henry J. Perry

New Multiwall Tuber

Smith & Winchester Mfg. Co., who for years have built tuber and bottomer type of machines for single and multiwall bags, and, as a pioneer in the gusset type multiwall sewed valve type bag machine (having built the first complete sewed valve type tuber in 1929), have kept abreast of and improved the machine as speeds and types of bags have been called for. They have just completed and shipped two of a new design multiwall paper bag tuber for making multiwall sacks for either the sewed gusset type or flat pasted bottom type bag.

These machines produce a wide range of sizes and up to six walls. The speed obtained is up to 700 feet of paper per minute and the machines will cut tubes to register with a printed outside sheet, which can have a straight cut-off, a thumb lip cut for open mouth or satchel bottoms, and the valve lip type for sewed valve bags.

There are several new features included in these new machines which produce very accurate register of the printed pattern and the cut-off. An entirely new type of compensating back drive unit controlled by the electric eye or by manual push button. The drive has a fully enclosed differential and gear change mounted in a case and running in oil. The machine is heavy to stand the high speeds and also is simple to operate having a minimum of change parts and has a number of features not found in other machines.

NEW "DA" LANGSTON SLITTER

Samuel M. Langston, Camden, N. J., manufacturers of slitters and roll winders, corrugated container machinery, and spiral tube winding machinery, have added to their heavy duty line of type "DA" slitters and winders or rewinders, permitting operating speeds of 3,000 feet per minute and higher.

The "DA" machine can now be equpped with "V" belt drives for winding drums, driven slitter shaft, and the top pressure or riding roll. Thus, all main drive gears are eliminated. In addition, the rear winding drum is equipped with a variable pitch "V" belt sheave so that the relative speeds between the two winding drums can be adjusted to suit grades of paper or board, and roll density or hardness required.

The new gearless drive has proven itself under high speed operating conditions to be very smooth and flexible. It is very much quieter than gear

Belt Drive shown with Guard removed on New DA Langston Slitter. Note separate drive to top riding or pressure roll, and adjustable sheave on rear winding drum.

drives, even at top speeds. It is anticipated maintenance will be substantially reduced.

The main winding drums, power driven slitter shaft, idlers, and top pressure or riding roll are statically and dynamically balanced for high speed performance. In addition, the winding drums are equipped with hydraulic brakes so that the machine can be brought to a smooth and rapid halt at the end of each roll.

The "DA" machine still retains its heavy cast iron bedplate and heavy cast iron box section side frames which contribute to its ruggedness and long life, and which enable this high speed machine to turn out top quality rolls. Langston's well-known principle of combination friction and power driven shear cut slitters, has been incorporated in the machine.

As optional equipment, automatic hydraulically operated Roll Ejectors and Roll Drops can be furnished.

One of these high speed machines was recently installed at Hamnermill Paper Co.'s Erie, Pa. plant. The second machine of this type is about to be installed in Hammermill's mill, and the third is on order.

Expansion at Hudson Pulp & Paper Corp.

Southern Division, Palatka, Fla.

Construction is well under way on the expansion to the present Hudson Pulp & Paper Corp., Southern Division, Palatka, Fla., mill. This program calls for increasing the capacity of the mill output to a total of 400 daily tons of finished unbleached kraft bag and wrapping papers. Both the pulp and paper mill facilities are being doubled. The pulp mill and the paper mill extension has been laid out so as to provide a separate unit for the preparation of light weight papers; the existing system to be continued for the manufacture of heavy weight grades.

A water treating plant, which was not included in the original installation, is being added. It will have a capacity of twelve million gallons per day, served by additional large capacity process water pumps.

The wood yard and wood room facilities are being doubled in capacity with the installation of a new suspended barking drum, log and chip conveyors, chipper, two chip screens and auxiliary sawdust and refuse conveyors. Three new glazed tile silos will provide ample storage for chips.

In the digester room, there will be five new ten ton digesters, each arranged with heaters, strainers and pumps for indirect cooking. There will be a separate gassing-off system for the recovery of turpentine. The present blow-down heat recovery unit will be supplemented to take care of the additional digesters.

A new blow tank equipped with an agitator and tramp iron trap will provide ample storage ahead of the three new 8 ft. by 12 ft. counter-current brown stock washers and deknotters. Auxiliary filtrate and black liquor storage, soap skimming and foam tanks are located adjacent to the new wash room.

Following the washers are rotary screens, two used as primary screens and one as a secondary screen. Tailings from these flow by gravity to a tailings flat screen, the accepted stock from which is put back into the heavy weight paper system. Screened stock is thickened on a new 8 ft. by 14 ft. vacuum decker. The new washed stock and screened stock chests will be of glazed tile construction equipped with propeller type agitators.

The stock preparation room has been laid out for both continuous and batch colored stock systems. A unique arrangement of chests will provide maximum flexibility of preparation of colored stock with a minimum of lost time and production when changeovers are made. These chests in the refining room are also glazed tile, as well as the white water storage chest. Consistency regulators provide a controlled consistency for the screened stock to the hydrating jordans and the two special three roll beaters. Final stock preparation ahead of the paper machine is furnished by four finishing jordans.

The new paper machine will be a Pusey & Jones 234 in. special Fourdrinier MF and MG kraft machine. Stock will be regulated to this machine through a metering stuff box, from which the stock will go to a 20,000 g.p.m. fan pump driven by a synchronous motor with an electric coupling for providing speed variations. The Fourdrinier is of the latest design and, in addition to the couch roll, has a wire drive roll. There will be a pickup transfer felt and suction roll. The press section consists of a transfer press and a three roll dual cloverleaf press. The drying section consists of a creping dryer and three sections of main dryers, with a total of 33-60 in. diameter paper dryers and 14 felt dryers, including 10 Feeney dryers. Between the first and second dryer sections there will be a smoothing press and between the second and third section of dryers there is a 12 ft. diameter Yankee dryer. One 8 roll calender stack, Pope reel and a high

Figure 2—View of original woodyard before expansion. Figure 3—Washer and screen room installation which is being supplemented by new units. Figure 4—A new Pusey & Jones, 234 inch Fourdrinier will be similar with improvements to the original 234 inch machine shown above. Figure 5—Another 7500KW turbo generator similar to the original unit shown above is now being installed.

speed winder will be provided at the finishing end. This machine is designed for a top speed of 2,000 feet per minute and will be driven by an electric sectional drive. The machine is equipped with the usual auxiliaries, including the oiling and condensate systems and vacuum pumps. A new type of tile lined wire and wet broke pit was designed especially for this new type of machine.

There will be a conventional broke beater at the dry end, supplemented by a broke pulper located in the stock preparation room. All water from the wet broke and wire pit will be pumped to vacuum saveall for the recovery of fibers in the white water.

A new sextuple effect evaporator unit will supplement the existing unit. The new recovery boiler will be a 250 ton unit equipped with a Cascade evaporator. There is a precipitator for recovering the dust from the gases from the recovery unit.

The existing causticizing plant is being expanded to provide the additional white liquor required. New equipment includes a slaker, causticizing tanks, green liquor clarifier and green liquor dregs washer, lime kiln, and lime mud vacuum filter.

Additional new and reburnt lime storage tanks with lime handling systems are also included.

Power plant extension consists of one new oil-fired boiler and one new refuse boiler, both duplicates of the existing power boilers. A bark burning furnace is provided on the refuse boiler. A new 7500 KW turbine supplies the additional power required.

No expansion to the converting plant is included in this program, as this portion of the mill was doubled recently.

A new office building is nearing completion and will be ready for occupancy in the near future.

Recent Development on Combustion-Engineering Equipment

1. C-E Chemical Recovery Units recently placed in operation in a large Southern pulp and paper mill are producing steam at 860 psi and a total steam temperature of 825 F. This is the highest steam temperature yet used on any recovery unit burning black liquor.

2. Outstanding results have been obtained on a power boiler designed with a bark burning furnace for the Chesapeake Corp. at West Point, Va. This installation features high-set C-E spreader stoker feeding units and employs a maximum of overfire air in order to insure that the maximum amount of material will be burned in suspension. Efficiency, flexibility and general reliability of this unit have featured its operation with wood refuse fuel.

3. A new C-E Raymond Flash Drying System installed at the Chesapeake Corp. to dry lime sludge fed to the lime kiln has met with notable success. It is reported to have increased the capacity of the kiln from about 55 to 85, or more, tons of lime per day. The oil consumption was reduced by 25 percent at this higher capacity.

Expansion at Lee Paper Co.

E. P. McGinn

Industrial Editor, Paper Trade Journal

Within the past several years there has been a tremendous expansion in the Pulp and Paper industry but a high percentage of the new mills have been built for the production of kraft pulp or paper and many of the new paper machines have been built for the manufacture of kraft liner, bag or wrapping with a lesser number for tissue and book papers. Therefore, it is real news when a new paper machine is designed and built especially for the production of rag and sulphite high grade, printing and specialty papers.

The Lee Paper Co. at Vicksburg, Mich., has just put into operation the first such new paper machine in many years.

This company was founded in 1903 and the mill at Vicksburg put into operation in 1905. Since that time they have been one of the foremost producers of fine papers.

To house the new paper machine, a building, 216 feet long by 114 feet wide was constructed. The lower floor of this building is of reinforced concrete and the upper part is steel and concrete with a brick exterior. The new structure was built on the north side of the old paper machine building with the beater rooms connected at the east end of the second floor with a common finishing room at the west end. The common wall between the old and new buildings, separates the back of number 2 machine from the back of the new machine number three. There is sufficient space in the new building for an additional new machine in the future.

The ground level contains the lower parts of the paper machine, including the dryer pit, couch and wire pits, lower parts of stock chests, etc. Underneath the finishing room a new machine shop has been installed. There is also storage space on the north side of the ground floor.

The paper machine is located along the south wall of the new building with the wet end of the machine and the beater room to the east.

Beater Room

The beater room for No. 3 machine although located in a new building is joined directly to the old beater room. Stock lines are connected through so that most of the equipment is interchangeable between the new and old paper machines. The new beater room contains: one tile-lined Jones Pulpmaster No. 3 having a capacity of 2000 lbs. of dry stock at 3½% consistency; one stainless steel clad Jones Pulpmaster No. 2 having capacity of 1000 lbs. of dry stock at 3½% consistency; two Jones Bertrams beaters, white tile lined, each having a capacity of 1000 lbs. of stock; two breaker beaters, also lined with white tile and each having a capacity of 1000 lbs. of stock; two Morden stockmakers and two Jones Imperial jordans equipped with stainless steel tackle; and one vertical oval tile beater chest equipped with two propeller agitators having a working volume of 1800 cu. ft. and a capacity of about 4000 lbs. of stock at 3½% consistency; one tile machine chest with propeller agitator having a capacity of about 2000 lbs. of stock.

The stock is broken up in the Pulpmasters. The baled pulp is charged into the Pulpmasters, rag half stuff is fed into and beaten in the Bertram beaters, and broke is handled in the breaker beaters. The stock is blended in the beater chest and the mixture passes through the Morden Refiners and the Jones jordans to the machine chest.

Number Three Paper Machine

The new machine is a Beloit Fourdrinier having a wire 75 ft. long by 132" wide. The machine trims 116" and has a maximum speed of 450 feet per minute. The suction couch has a diameter of 26 inches. Wire pit and couch pit are tile lined. These linings as well as machine chest tiling were installed by Kalamazoo Farm & Silo Co. The beater chest and the Jones Pulpmaster tilings were installed by Chemical Linings Co.

The press section consists of two plain presses having 23" dia. stonite top rolls and 24" dia. rubber-covered bottom rolls.

There are 37 paper dryers and three felt dryers all 48" diameter and grouped into three sections containing 14, 14, and 9 dryers respectively.

The machine is also equipped with a size press between the second and third dryer sections.

The size press is a reverse unit equipped with rubber covered rolls. The sheet is immersed in the sizing material. The first dryers in the first section and the first two dryers immediately following the size press are stainless clad.

The calender stack consists of one 24" diameter bottom roll fitted with babbitted sleeve bearings, two 16" diameter intermediate rolls and five 12" diameter top rolls. All rolls except the bottom are equipped with SKF Anti-friction bearings.

The reel is a Pope type, constant speed unit and the winder is a Moore and White Machine with a drive designed by Lee Paper Co. engineers. The winder is not located in the usual position at the end of the paper machine, but is across the aisle from the reel. Full reels are carried from the reel stand to the winder by an overhead crane.

The paper machine drive is a new type, built by Beloit Iron Works, the first of its kind in the U. S. and the second in the world. The first unit has been in operation for several months at Oslo, Norway. This is called a differential drive, with the line shaft passing through all of the gear units of the ten section drives (except the units at each end). Each section drive is equipped with a PIV unit and an air couch to give draw adjustment. Overall speed control of the machine is obtained from a General Electric motor generator set.

All press rolls, suction couch and size press rolls were rubber covered by Stowe-Woodward Company press roll and size press roll bearings, felt dryer bearings and calender roll (except bottom roll) bearings are SKF anti-friction. Paper dryer rolls have babbitted sleeve bearings. All bearings are lubricated by a Bowser pressure feed system which filters, cools and circulates the oil to the bearings.

Finishing

The finishing room is located along the west end of the new building, above the machine shop. Equipment includes three new Hamblet cutter layboys with six roll backstands, two new Harris-Seybold trimmers and one embossing machine.

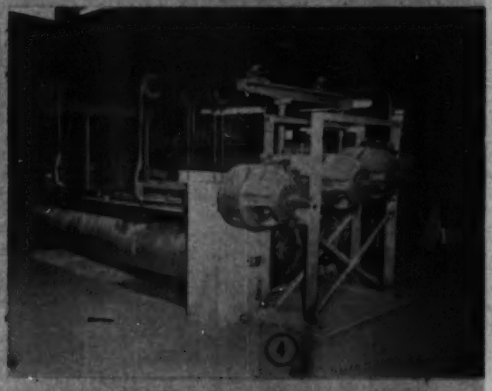


Figure 1—Morden refiners being installed for use on number three paper machine. Figure 2—Dirtec installation for new paper machine, the wire pit of which is shown in foreground. Figure 3—Construction of number three paper machine as seen from the dry end. Figure 4—Moore and White slitter, winder for number three machine. Figure 5—Front view of Hamblet cutter-layboy units with backstands at right. Figure 6—Seybold trimmer.

Rag Plant

The older part of the mill includes a rag cooking plant containing two rag sorting tables where foreign materials and rags containing synthetic fibers are removed. The rags pass through the sorting rows on belt conveyors from which women sorters remove the undesirable material. The accepted rags are carried through on the conveyor belts to a pair of cutters from which cut rags are then carried on belt conveyors over magnetic separators which remove paper clips, nails, etc. The conveyors then carry the rags to the loading floor located above the cookers. There are four of these boilers, each eight feet diameter and twenty-five feet long. They are arranged in pairs, end-to-end and rotate about ⅓ RPM around a horizontal axis. The boilers are loaded and unloaded through manholes in the sides. For loading, the unit is rotated until the manholes coincide with openings in the loading floor. Manhole covers are bolted on. Each Cooker holds 10,000 lbs. of rags which are cooked for about 10 hours with mild alkaline cooking liquor at maximum pressures of about 35 PSI.

On completion of the cook the steam and spent liquor are blown off and discarded. The manhole covers are then removed and the cooked rags allowed to fall out into carts placed underneath. Material that does not fall out must be pulled out by hand with the aid of long-handled hooks.

The cooked rags are then carried to the washers, which are regular hollander beaters equipped with octagonal washing drums. There are eight of these units each holding 1200 lbs. of stock. The stock is washed for about 1½ hours with the roll up, after which the roll is lowered to break the rags down into fibers. After being reduced to fibers the stock is bleached with calcium hypochlorite and then washed again. The stock is then dumped into chests with false bottoms where the water is allowed to drain off. The drained stock, now called *half-stuff* is moved to the beaters, as needed, in boxes carried on lift trucks.

The old beater room contains fourteen copper-lined wooden tub beaters, each holding 600 lbs. of dry stock at 3½% consistency, and one white tiled lined Jones Bertrams beater that holds 1000 lbs. of stock.

There is a tile lined beater chest and machine chest for each of the two paper machines in the old mill. Each of these chests has a capacity of 2800 lbs. of stock at 3½% consistency.

There are two Jones Imperial jordans and one Morden-refiner which may be used interchangeably on machines 1 or 2.

Number one machine is equipped with two Bird screens and number two machine has two Jones Leithwalk screens.

These two paper machines are almost identical right hand and left hand Black Clawson Fourdriniers, each having 122½ inch wires and trimming 108 inches. The production of each machine averages 20 tons per day.

The mill has its own power plant with a comparatively new (1946) B&W pulverized coal boiler rated at 60,000 lbs. of steam per hour and 450 PSI pressures. There is also a stoker fired Sterling boiler having a capacity of 75,000 lbs. an hour at 250 PSI.

Coal is brought to mill in R.R. cars

Figure 7—Supercalender equipped to handle sheet stock. Figure 8—New Cameron Machine Company rewinder. Figure 9—Two of the four rag cookers. Figure 10—Beaters for machines one and two.

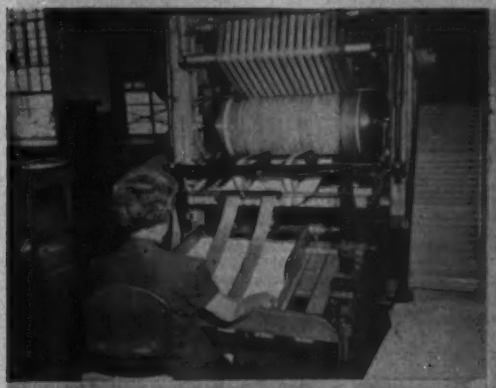


Figure 11—Left, Gordon Moore Plant Engineer; right, Leroy Keller, Beloit Construction Engineer. Figure 12—Norman Bardeen, Jr., Vice-President and Maxwell Bardeen, President. Figure 13—Charles Gardner, Assistant Superintendent. Figure 14—Ralph Atkins, Superintendent. Figure 15—L-R, Richard Hussey, Chief Power Engineer; Gordon Daniels, Assistant Power Engineer. Figure 16—L-R, Leo Leas, Maintenance Foreman; Dr. Stephen Kukolich, Research Director; and Roland Reed, Finishing Room Foreman.

on a track adjacent to the boiler house, and is dumped into a pit below the track, from which it is carried up to a small bin above boiler level by a Stephens-Adamson Redler Coal handling system. A horizontal conveyor then carries the coal to the boliers where it is continuously weighed before passing to the pulverizer or stoker.

Electric power is generated at 480 volts, 3 phase 60 cycles by a 3125 KVA turbogenerator using steam at 450 and exhausting at 15 PSI.

One of the unique features of this mill is the method of handling ash from the boilers. Ashes from the ash pit hoppers, fly ashes from dust collector hoppers and other points of accumulation feed by gravity into the ash conveying system. The latter serves one underfeed stoker fired boiler and the new 60,000 lb. per hour pulverized coal fired boiler. Dust-tight connections are made to the various hoppers and the ashes are conveyed pneumatically at a capacity of about 12 tons per hour to a Hydro-nuveyor receiver and separator located on top of the boiler house. At this point, water is introduced into the system so that the mixture of water and ashes is sluiced by gravity to fill ground area located several hundred feet from the power plant. A steam exhauster is used for creating the air flow at the required vacuum for transporting the ashes in the pneumatic system.

The above system is one of the extra precautions taken to prevent contamination by dirt of the high grades of paper produced in this mill.

Equipment and Suppliers

Ash Removal System, United Conveyor Co.

Roll Coverings — New Paper Machines, Stowe-Woodward Co.

Coal Handling System, Stephens Adamson Co.

Anti-friction Bearings on Paper Mach., SKF Co.

Two Refiners, Stock Preparation Equipment, Morden Co.

Two Trimmers, Harris-Seybold Co.

Two Cutter Layboys, Hamlet Machine Co.

Stock Chests, Machine Pits Pulpmaster, Chemical Linings Co.

Seven Dirtocs, Bird Machine Co.

Winder Driver, Paper Mach. KC Drive Motor, MC Set, General Electric Co.

Paper Machine Lubrication System, Bowser Co.

Paper Machine Hood & Vent. System, J. O. Ross Eng. Co.

Fourdrinier, Beloit Iron Works.
Paper Machine Winder, Moore & White Co.
Screens, Stock Preparation Equipment, E. D. Jones.
Tile Work, Kalamazoo Tank and Silo Co. and Chemtile Company.
Calender Stack, Farrel-Birmingham.
Vacuum Pumps, Nash.
Cranes, Manning, Maxwell & Moore, and American Monorail.
Two Pulpmasters, two Bertrams Beaters, two Majestic Jordons, E. D. Jones.
10 Felt rolls, 1 Bottom 2nd Press roll, 1 Top Size Press roll, 1 Bottom Size Press roll, 1 Microrok Top 2nd Press roll, 1 Microrok Top 1st Press roll, 1 Microrok Top Breaker Stock roll, 1 Bottom Breaker Stock roll, 1 Bottom 1st Press roll, Stowe-Woodward, Inc.

Figure 17—Stephens-Adamson coal handling system in center. Part of United conveyor ash disposal system may be seen on top of boiler house.

Developments By Puseyjones

In keeping with the present trend for higher speeds and greater production, Puseyjones have incorporated in their recent machines many new developments and improvements, assuring minimum shutdown time and easier handling and operating facilities. Several machines having such features are referred to herein.

Now in the final stages of mill erection in a prominent mill in Florida is the largest machine intended for the manufacture of lightweight kraft paper. This machine is equipped with the new vacuum pick-up and transfer arrangement recently proved out on several smaller machines. In addition, it is equipped with a 12 ft. Yankee dryer so that either machine finished (M.F.) or machine glazed (M.G.) papers may be manufactured as desired. This feature is a first where the vacuum pick-up is also employed.

The machine referred to is designed and constructed for a maximum operating speed of 2000 f.p.m. with air pressure type head box and slice, and fourdrinier part for wire 236" wide, 130' long. This width and high speed require special consideration of lightweight formation conditions, therefore the breast roll is 34" diameter, table rolls 12½" diameter, suction couch 42" diameter, and auxiliary drive couch roll 34" diameter. For minimum man-hours and production loss, wire changing is accomplished with a greatly improved Puseyjones "Rapi-drape" device, including Hydra-motor unit for raising and lowering the breast roll.

Four suction rolls are used in the pick-up and press part comprising 26" pick-up roll, 36" transfer roll, and two 36" main press rolls, the latter in dual combination, with a 60" center roll of so-called clover-leaf arrangement.

A 42" receiving dryer is arranged for creping and the dry part consists of thirty-five paper and fourteen felt dryers, all 60" diameter. A smoothing press, which also may be used for striping, is located between the first and second dryer sections. The 12' Yankee dryer unit is also equipped with a special striping roll and follows the second dryer section. To simplify the handling of the sheet and minimize breaks when by-passing the Yankee dryer running on M.F. grade, a third section of four 60" paper dryers is located between the Yankee dryer and the single stack of calenders.

Other new features include air-controlled tension on the fourdrinier wire, improved vacuum connections to the flat boxes, and quick-handling device for removing and replacing individual boxes. Air loading has been incorporated in the calender stack and the reel redesigned to prevent vibration and jumping, to the end that "bull's-eye" rolls are produced.

A similar machine but narrower in width is now under construction for one of the largest paper mills in Louisiana. This machine is scheduled for operation early in 1952.

A 180" machine now under construction for a mill in Wisconsin manufacturing fine papers will have a new development in connection with the suction couch roll arrangement. Instead of the conventional installation in which the roll is supported from the sill plates with cantilever extension on the drive end, the roll will be supported directly from the fourdrinier frames in such a manner that the cantilever extension is unnecessary when changing wires. This permits the use of a smaller bearing on the back and eliminates risk of bearing failure due to concentrated load on the bearing while stationary. The improvement may be used only with the Puseyjones "Rapi-drape" wire changer, which does not require removal of the fourdrinier proper from operating position.

Also in connection with this same machine and others more recently ordered, the "Rapi-drape" wire changer is being further improved by combining the breast roll, doctor and forming board into a single raising and lowering unit, thereby providing more slack in the wire and reducing the wire changing time.

Improvements have been made in the Puseyjones flow spreader, affording quicker means for inspection and cleaning; also in the closed pressure slice, several of which are now in process, one in particular for a machine intended for a daily production of 700 tons of kraft liner.

It has been said that all changes are not improvements; however, as proven time and again, the investigation and development of new ideas, in many cases originating in the paper mills, are essential to the paper machine of tomorrow.

Crossett Expansion

E. P. McGinn
Industrial Editor Paper Trade Journal

Since it first went into operation in 1937, Crossett Paper Mills, at Crossett, Arkansas, has been constantly improved and modernized. The necessary postponement of all improvements and even major repairs during World War II resulted in an especially vigorous spurt of expansion and modernization at the end of the war.

Although improvement and modernization are expected to continue indefinitely at Crossett, the end of this particular phase of expansion is now in sight.

Crossett Paper Mills is a division of Crossett Lumber Co. At present none of the wood waste from the lumber mill is used in the pulp mill. However one of the improvement projects scheduled for the near future is the installation of debarking equipment in the lumber mill so that slabs, edgings, and other lumber mill waste can be chipped and used for pulp manufacture.

Wood Supply

Like other Southern mills, Crossett receives wood by truck and rail. The Missouri Pacific and the Rock Island as well as two short lines called the Ashley, Drew and Northern and the Arkansas and Louisiana Missouri all provide freight service to Crossett.

The woodyard has a storage capacity of about 10,000 cords of five-foot pine pulpwood which is conveyed from the yard to the barking drums by a cable conveyor.

The two D. J. Murray barking drums are each 12 feet in diameter by 45 feet long. Cleaned logs from these drums are carried by conveyor up the chipper house where they are sent to the two D. J. Murray 96 inch four knife chippers, equipped with Westinghouse 125 HP V-belt drive wound rotor motors. Chips are screened on three Rotex vibrating chip screens.

Figure 1—Pulpwood unloading from cars to cable conveyor leading to barking drums. Figure 2—Two 12'x45' D. J. Murray barking drums supply clean wood to the chipper house at the rear. Figure 3—Pair of D. J. Murray chippers. Figure 4—Battery of three Rotex vibrating chip screens.

Undersized material from the chip screens is sent, with the bark from the barking drums, on a chain and slot conveyor up to the bark burning boilers. Oversize chips are put through a rechipper and returned to the system.

Accepted chips are carried on rubber belt conveyors to the chip bins located above digesters 1, 2, 3 & 4. A large silo will soon be built to provide additional chip storage. These four digesters receive chips directly from hoppers in the chip bins. A short belt conveyor carries chips from number four hopper to number five digester. Another belt conveyor also delivers chips to a short bucket elevator, from which they are discharged to another rubber belt conveyor extending over digesters six, seven, and eight. A tripper transfers the chips from the belt to the proper digester.

The reason for this rather complicated chip handling arrangement is that when the original group of four digesters was installed, overhead chip bins were in general use. When number five digester was installed, the newer method of feeding chips directly to the digesters from belt conveyors had been developed. The installation of digesters six, seven, and eight, has only recently been completed. Eventually the chip conveyor system will be simplified and chips delivered direct from a bin in the ground by one belt. Each of the eight digesters has a volume of 2770 cubic feet and produces eight tons of pulp per cook. The total daily production of screened pulp is somewhat over 400 tons per day.

Until the recent installation of an Impco three stage vacuum washing system, all of the pulp was washed in the 12 diffusers. However, the new vacuum washers have sufficient capacity to handle 240 tons per day or ⅗ of the total production. Therefore, ⅖ of the production must still be washed in diffusers. Each diffuser holds one blow, eight tons of stock. Pulp is blown from a digester through a cyclone to a diffuser, washed for about eight hours, and then pumped to number one screen room.

Pulp from five digesters is blown to a new Hammond blow tank that has sufficient capacity to hold four blows (32 tons). The cone bottom is equipped with a torque controlled, agitator type consistency regulator. Steam from the blow tank is passed to a blow heat recovery system.

Pulp from the bottom of the blow tank is pumped to the vacuum washing system. The first unit in this system consists of the Impco vibrating knotters from which the accepted stock passes to the first stage of washing, each having vacuum cylinders 8 feet diameter by 16 feet long. A Ross hood and ventilating system removes steam and other vapors from the washers and thus helps to reduce the heat and humidity in the washer room. Filtrate from each stage of washing flows to the seal tanks on the ground

Figure 5—New Hammond blow tank at left. Digesters at right.

floor of the washer building. Liquor from the first stage is sent to black liquor storage. Foam from all filtrate tanks is relieved to a vertical cylindrical foam tank equipped with a foam breaker.

Washed pulp from the third washer is carried by screw conveyor to a two foot wide rubber conveyor belt which carries it up to the top of a high density storage tank. The belt conveyor was built by Continental Gin Co.

The high density storage tank is 30 feet diameter by 48 feet high and holds 150 tons of stock at 15 percent consistency. Oscillating nozzles in the bottom of this tank dilute the stock to 4 percent consistency for pumping, with white water from the screened stock decker seal tank.

New Screen Room

The diluted pulp from the high density tank is pumped to a surge tank from which the pulp is constantly recirculated through a consistency regulator to adjust to 3 percent. From the surge tank, pulp at 3 percent consistency is pumped up to a head box with an overflow return to the surge tank. The head box feeds a large Cowan rotary screen from which the accepted stock flows to an 8 x 14 Impco decker. Stock from the decker flows into a storage tank below, from which it is then pumped to the beater room.

Rejects from the Cowan screen go to an Impco rotary secondary screen. Accepted stock from the secondary screen goes to a stock standpipe and thence back to the Cowan screen.

Rejects from the Impco rotary screen go to a flat tailing screen from which the accepted stock also goes to the above standpipe and the rejects go to a tailings tank. All rejects from number one screen room also go to this tailings tank, from the tailings are pumped to a tyler "Ty-Pocket" vibrating screen from which the rejects go to a knot reject tank and thence back to the digesters for recooking.

Old Screen Room

Number one screen room contains four Impco rotary knotters which handle stock from the diffusers. Rejects from these screens go to the tailings tank in number two machine room and the accepted stock goes to the screened stock system.

Paper Mill

Stock from the screened stock storage chests is pumped to the beater chests from which it is pumped to the respective jordan headbox of each machine. Number one machine is equipped with six No. 6 Shartle Miami jordans and number two machine has five No. 6 Shartle Miami jordans. Each jordan for number two machine is equipped with a Shartle Duotrol automatic plug control. These jordans may be controlled automatically by the Duotrol or remotely by push buttons on a control panel in the machine room or manually by handwheel. The machine room control panel also has meters showing the power setting of each jordan. Number one machine jordans are controlled only manually by handwheels.

Stock from each set of jordans flows to the respective machine chest for each paper machine. Stock from number one machine chest is pumped up to the regulating box and then goes to the 25,000 GPM fan pump, which is driven through a V-belt drive by an adjustable speed AC motor.

Number one machine was built by Bagley and Sewall and installed at the time the mill was built. In 1948, the existing enclosed pressure headbox was installed. This headbox was designed by Crossett engineers and built to specification by Southern Tank & Boiler Co., Memphis. Four rectifier rolls in the headbox are driven by roller chains and sprockets from a single gearmotor.

For several feet from the breast roll, there are no table rolls supporting the wire, but there is a series of forming boards.

The Fourdrinier is equipped with a wire 21 inches wide by 90 feet long.

There are two suction presses and a smoothing press and the dryer section contains 50 five foot dryers, equipped with SKF anti-friction bearings.

A single nine roll calender stack is followed by a new Beloit reel. A new Euclid 20 ton reel crane carries full reel shafts to the cameron Number 20 slitter-winder, which is driven by a Westinghouse D. C. winder drive.

Number one machine has a maximum trim of 196 inches and a maximum speed of 1600 FPM, this machine is driven by a Westinghouse sectional electric drive.

Figure 6—New washer and screen room building at left, with blow tank at center. Figure 7—Impco 8'x16' three stage vacuum washing system equipped with Ross hood and ventilation system. Figure 8—Impco vacuum washer cylinder. Figure 9—New Cowan rotary screen. Figure 10—Impco rotary fine screens. Figure 11—Tyler "Ty-Rocket" vibrating tailing screen.

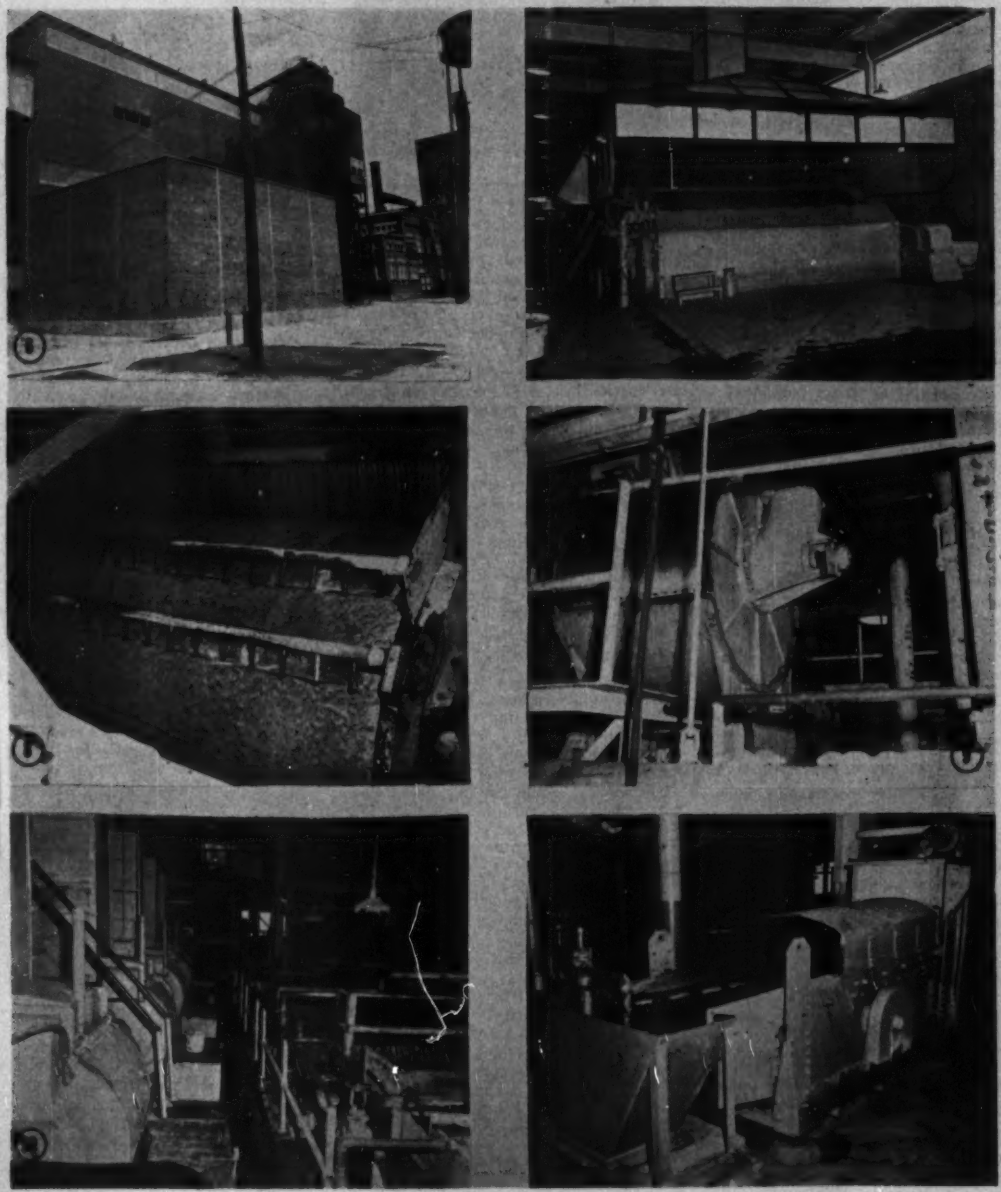


Figure 12—Shartle Miami jordans equipped with ductrols for No. 2 paper machine. Figure 13—Peerless fan pump on No. 2 paper machine. Figure 14—Rear of pressure headbox on No. 2 machine showing Beloit stock inlet. Figure 15—Fourdrinier part of No. 1 machine. Figure 16—Fourdrinier part of No. 2 machine with jordan control board at left. Figure 17—No. 2 paper machine from wet end.

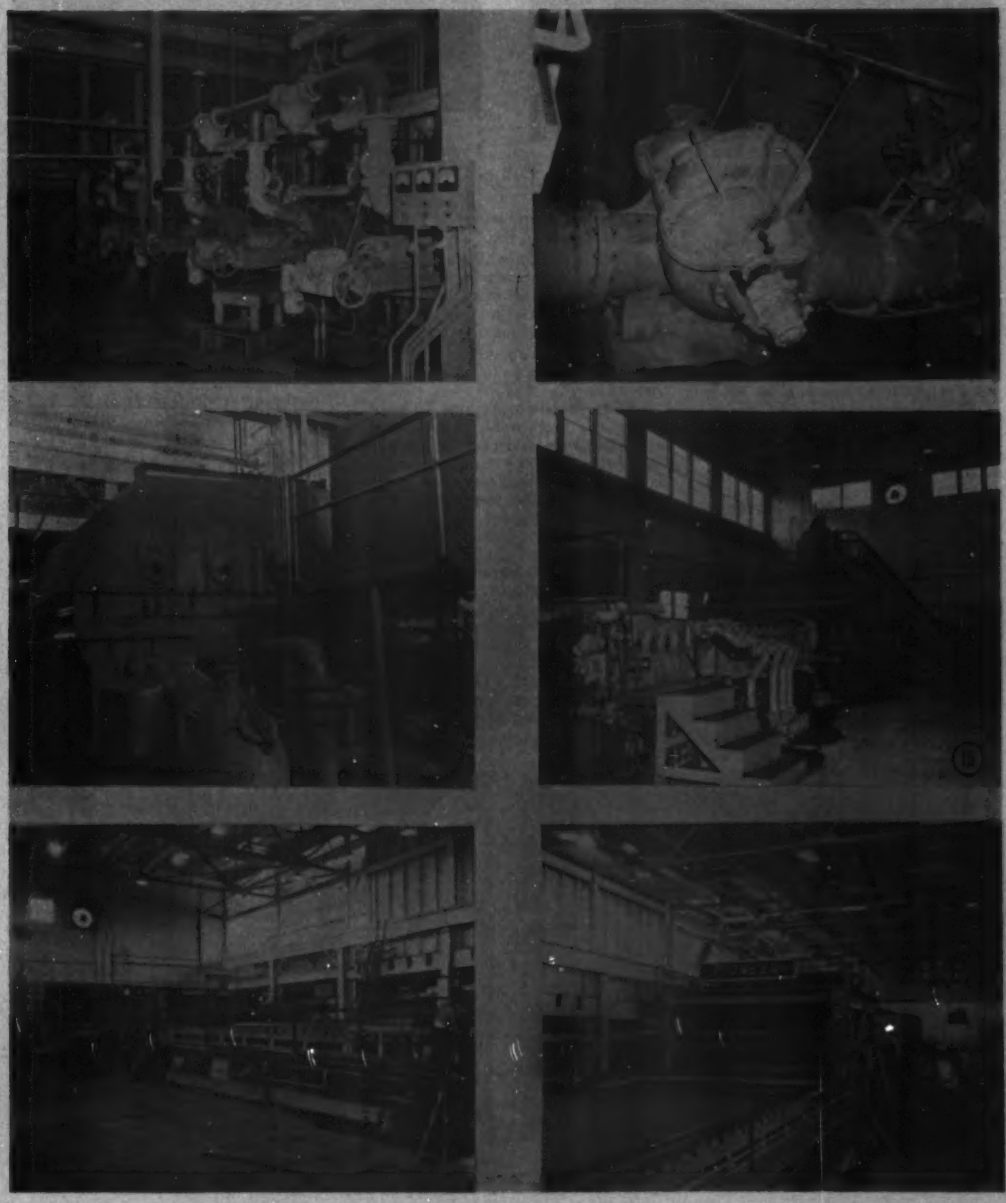


Figure 18—New Beloit reel on No. 1 paper machine.

Figure 19—Battery of vapo spray units moistening paper after calender stacks on No. 2 paper machine.

Number Two Machine

Number two (The Pioneer) is a comparatively new machine having been in operation only about one and one-half years. This machine was built by Beloit Iron Works and was designed for high speed operation on light weight papers. The maximum speed of this machine is 2000 FPM. It has a wire 216 inches wide by 126 feet long. Maximum trim is 196 inches.

The machine has an enclosed pressure headbox similar to that on number one machine, also built to Crossett specifications by Southern Tank & Boiler Works. The four rectifier rolls are driven from one gearmotor through sprockets and roller chains.

The fan pump is a Peerless 25,000 GPM driven by a 200 horsepower General Electric D.C. motor through a V-belt drive. Stock is carried to the head box through a Beloit inlet. Between the breast roll and the first table roll there are seven forming boards. The first eight table rolls are brass covered and the remaining 13 table rolls have Micarta covers. There are seven flat suction boxes.

There is a large white water tank on a gallery above and in back of the Fourdrinier on this machine. This tank is used as a reserve to fill the wire pit after a shut down.

Crossett plans to install a Deculator system on number one machine in the near future.

On number two machine (The Pioneer) the wet web is not couched from the wire and transferred to the first press by conventional means, but is directly couched from the wire to a top press felt by means of a pickup roll.

The wire, on leaving the suction couch, instead of going back toward the breast roll is carried forward and down at an angle of about 45° by a plain secondary couch or drive roll. The pickup roll makes contact with the web on this flat angular surface of the wire at a point several inches from the suction couch. This pickup roll which is also a suction roll is mounted on a movable arm so that it has a small, precisely controlled movement toward and away from the wire. After being picked up on the top press felt (or pickup felt) the sheet enters a suction press where it is transferred to the bottom press felt which carries it to the first suction nip of the clover-leaf press. The web then travels around the bottom of the press center roll and enters the second suction nip of the clover-leaf press.

The clover-leaf press consists of a five feet diameter center roll suspended by a rigid supporting column from the frame above. The suction press rolls instead of being pressed against the center roll in horizontally opposed directions, are each offset downward about 45° so that the forces of their pressures are partly opposed to each other and partly directed against the supporting column of the center roll.

The dryer section contains 32 five-foot dryers, 24 before and eight following the size press. All are equipped with SKF anti-friction bearings. The single, Beloit 10-roll, open side, cal-

Figure 20—New paper machine building at right uncompleted finishing room building may be seen at left rear. Figure 21—Twelve foot hydrapulper under construction in finishing building.

Figure 22—Blow tank at left. Recovery building at rear center.

ender stack is followed by a Beloit type reel. An Euclid 20-ton reel crane carries the full reel shafts to the Cameron slitter-winder which is equipped with a lateral, roll conveyor, shaft-puller. The winder is equipped with a Westinghouse d.c. winder drive.

Number two paper machine is equipped with a General Electric individual generator, sectional drive.

One of the newest features on this machine is the *Vapo* system installation. This equipment consists of a series of accurately spaced spray nozzles suspended above the paper and delivering an extremely fine water mist or vapor to the sheet for conditioning against curl or other expansion troubles. The spray system may be set at any point but is usually placed before or after the calender stack. The installation at Crossett is between the calender stack and the reel.

Dilts broke beaters are located under the dry ends of both paper machines. A new 11-foot hydrapulper is installed underneath the clover-leaf press on number two machine. A 12-foot Hydrapulper is being installed in the new finishing room to handle finishing room broke.

Both of the paper machines are equipped with Ross hoods and ventilating systems. Number one machine also has its own Bowser central lubrication system, while number two machine has a DeLaval system. A 30-ton Whiting overhead crane serves the entire machine room.

One of the unique features of this mill is the cooling system provided for the machine room personnel. Located about every 50 feet along the machine room aisle are short square ventilating ducts emerging through the floor from the basement. Cool air is blown from the louvres in the side of these ducts. Although these units have practically no effect on the temperature of the machine room they provide places where the men can go to get cooled off after a hot job near the dryers.

A new air conditioned office has been built on a mezzanine along the wall in back of the winder of number two machine. Offices are provided for the paper mill superintendent, assistant superintendent, four foremen and the finishing room superintendent and assistant superintendent. The entire side wall of these offices is of thermopane glass so that most of the area in the vicinity of the dry ends of the paper machines will be under observation from the offices.

Finishing Room

The new finishing room building will not be completed for a few months yet. When complete the building will be 192 feet long, 80 feet wide, and 54 feet high, and will be completely equipped, not only with the usual rewinders, cutters and layboys and guillotines but with floor level conveyors for transportation of the rolls.

The new enclosed train shed and loading platforms will adjoin the finishing building. This building will have three tracks with space for 28 railroad cars. Motor driven, floor level conveyors will run the entire length of the loading platforms.

The total length of this building is 472 feet. It has an offset which gives it a width of 86 feet for 276 feet and 64 feet width for the remaining 196 feet of its length.

Recovery System

Black liquor from the diffusers and from the first stage of the vacuum washing system is sent to storage tanks from which it is then sent to the evaporators. There are two sets of evaporators, one of which is a Swenson five-body, four-effect system and the other is a Goslin Birmingham five-body, five-effect unit. The latter unit was only recently placed in operation.

After the third stage of each evaporator the liquor is sent to a skimming tank where the tall oil soap floats to the top and is skimmed off. The liquor is then returned to the second stage of evaporation. Heavy black liquor from the evaporators is sent to the recovery building where it is further concentrated in the Cascade evaporators. Before going to the furnaces it passes through a mixing tank where makeup salt cake and salts recovered from the precipitator are added.

Figure 23—Part of the black liquor evaporator system.

Figure 24—Cascade evaporators on combustion engineering recovery furnace.

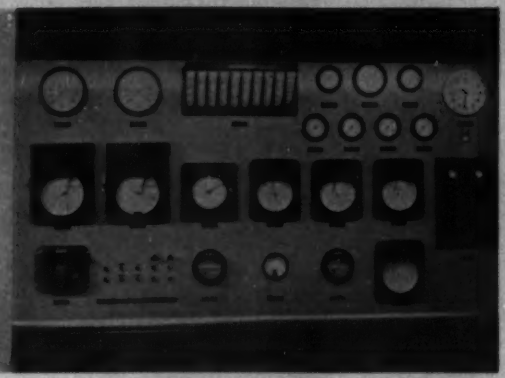


Figure 25—Recovery furnace instrument and control panel.

There are five recovery furnaces, four of which were built by Babcock and Wilcox with the newest and largest being a combustion engineering unit. The four Babcock and Wilcox units each produce 25,000 to 30,000 lbs. of steam per hour with black liquor or natural gas as a fuel. Number four is capable of producing 35,000 lbs. of steam per hour with natural gas or black liquor.

Furnace number five, the CE unit, has a capacity of 80,000 to 110,000 lbs of steam per hour with black liquor and also has a small gas burner to enable it to produce 35,000 lbs. of steam per hour from natural gas. All of these boilers, like the power boilers, generate steam at 450 p.s.i.

Smelt from the recovery furnaces flows into the dissolving tanks, from which the green liquor is pumped to the three green liquor settlers which are part of the old liquor making system. Most of the rest of the system consists of new Dorr equipment to provide a continuous liquor making and causticizing system. The clarified green liquor from the settling tanks overflows to a new storage tank 40 feet diameter by 22 feet high. From this tank the green liquor is pumped to the Dorrco Slaker. Underflow from the green liquor settling tanks is pumped to a dregs washer tank 20 feet diameter by 24 feet high. Overflow from this tank is used in the lime mud washer for dilution of the sludge from the white liquor clarifier. Underflow from this tank is discarded to the sewer.

From the slaker the mixed liquor and lime passes to the three causticizers each 12 feet in diameter by 12 feet high where the causticizing reaction is completed. The liquor is then sent to the white liquor clarifier tank, 50 feet diameter by 12 feet high, from which the overflow goes to two white liquor storage tanks, each 40 feet diameter by 22 feet high. The underflow from the white liquor clarifier is sent to a lime mud washer tank 35 feet diameter by 24 feet high from which the overflow is used in the dissolving tanks for making green liquor and the underflow is sent to the lime mud filter.

The kiln feed thickener tank was extended 12 feet in height to make it 26 feet diameter by 24 feet high.

The Traylor lime kiln, which has been in operation since 1941, is 300 feet long by seven foot diameter. It is fired by natural gas.

From the kiln, burnt lime is conveyed to a 500 ton storage bin, 24 feet diameter by 30 feet high.

Power Plant

In addition to the five recovery boilers there are four power boilers, two of which are equipped to burn either bark or natural gas and the other two being straight natural gas fired boilers. All of these power boilers were built by Babcock and Wilcox Company. The bark burners each produce 35,000 lbs. of steam per hour and the gas fired boilers each produce 100-120,000 lbs. of steam per hour. All the boilers generate steam at 450 PSI.

Electric Power

There are three Westinghouse turbogenerators, all operating at 3600 RPM on steam at 400 PSI 650°F. Number one turbine extracts at 40 PSI and exhausts to a condenser. Its generator produces 4375 KVA at 2300 volts, three phase 60 cycle AC. Number two turbine extracts at 140 and exhausts at 40. Its generator products 6350 KVA at 2400 volts three phase, 60 cycle AC. Number three turbine extracts at 40 and exhausts to a con-

Figure 26—Dorr lime slaker, in causticizing building.

Figure 27—New recovery building.

DYESTUFFS FOR BOARDS

You can put new life into your boards with color. Whatever the hue or degree of fastness, there are GENERAL dyestuffs to match the shade. Our technical field service is ready to help you obtain any color you want—clear, bright, fast shades of bristol, decorative boxboard or container board. Take advantage of our quick color matching service—formulas forwarded to you the same day we receive your request.

GENERAL DYESTUFF CORPORATION

L-R H. E. Bryant, Master Mech.; R. O. Conner, Asst. Master Mech.

denser. Its generator products 7500 KVA at 2400 volts, three phase 60 cycle AC.

Power is sent out to various load centers at 2300 volts where it is reduced to 440 volts. Some of the large motors operate at 2300 volts and the small motors operate at 440.

Number three generator was badly damaged in April of this year due to a freak accident with lightning. A lightning bolt struck one of the power lines and followed it back to the panel board in the generator room. There it jumped across contacts fusing a short circuit in the output circuit of number three generator. The circuit breakers were also fused so that the generator was running on a dead short. The whole power plant became so filled with smoke that the operators were driven from the building. By the time the operators were able to return with the aid of gas masks and shut down the generator, it had been running on short circuit for 35 minutes and was so badly damaged that it had to be rebuilt. With some excellent cooperation from the Westinghouse Corporation the machine was rewired in record time and returned to service.

Some of the buildings that were constructed to house the new projects included:

Paper Machine Room Extension
342 ft. long 43 ft. wide 58 ft. high

Washer Room
106 ft. long 40 ft. wide 69 ft. high

Screen Room
79 ft. long 53 ft. wide 67 ft. high

Recovery Room
86 ft. long 57 ft. wide 111 ft. high

List of Suppliers

Finishing Room

Winder, Beloit Iron Works.
Cutter and Layboy, Clark Aiken Co.
Wrapping Machines, Clark Aiken Co.
Hydrapulper, Shartle Brothers.
Dolovator, Williams & Wilson.
Heading Machine, Valley Iron Works.

Color Size Room

Color Mix Tanks, E. C. Wolfery.
Color Storage Tanks, E. C. Wolfery.
Rosin & Size Headboxes, E. C. Wolfery.

Screen and Washer Room

Flat Screen, Improved Paper Mach. Corp.
Brownstock Washers, Improved Paper Mach. Corp.
Decker, Improved Paper Mach. Co.
Knotter, Improved Paper Mach. Corp.
Cowan Screen, Montague Machine Co.
TY Rocket Screen, W. S. Tyler Co.

Caustic Room

Slaker, Dorr Co.
Clarifier Sweeps, Dorr Co.
Mud Washer Sweeps, Dorr Co.
Cowan Screen, Montague Machine Co.
Blow Tank, Hammond Iron Works.
Three Stage Vacuum Washing System; Screen, Improved Paper Machinery Co.
Central Lubrication System No. 2 Machine, DeLaval Co.
No. 2 Paper Machine, No. 1 Reel, Beloit Iron Works.
Continuous Causticizing System, Dorr Co.
Two Hydrapulpers, Dilts Machine Co.

L-R top row—D. B. Kuhe, Asst. Mill Manager; J. C. Hair, Prod. Supt.; Bottom row—R. W. Burnett, Paper Mill Supt.; C. W. Smith, Plant Engineer and E. J. Oatleaf, Chief Draftsman.

Figure 28—New Traylor 300 foot lime kiln. Figure 29—Number three generator which was recently damaged by lightning and rebuilt.

Belt Conveyor, Continental Gin Co.
Paper Machine and Washer Hoods, J. O. Ross.
Pressure Headboxes for Paper Machines, Southern Tank & Boiler Co.
Shartle Miami Jordans and Duotrols, Shartle Bros.

Five Effect Evaporator, Goslin Birmingham Co.
"Ty" Rocket Vibrating Knotter Tailing Screen, Tyler Co.
Paper Machine Fan Pumps, Peerless Pump Co.

Reel Cranes on Both Paper Machines, Euclid Crane and Hoist Co.
Paper Machine Drive, General Electric Co.
16 Felt rolls, 1 Conta-Dual Press Microrok roll, 1 Lumpbreaker roll, 1 Suction 2nd press roll, Stowe-Woodward, Inc.

50 Years of Progress

A Brief Historical Sketch of Northern Paper Mills

The history, the phenomenal growth and an implication of what the future holds for Northern Paper Mills may be condensed into a single sentence. "Within the comparatively short space of 50 years Northern Paper Mills has increased its man power and annual paper production from 25 workers and 800 tons to approximately 1000 employes and 68,000 tons."

Established a half century ago by seven men at the junction of the East and Fox Rivers in Green Bay, Wis., Northern has moved from an inconspicuous producer of paper to a nationally known organization that markets the finest in toilet tissue, facial tissue, handy roll towels and napkins.

The Northern story is one covering the period between 1901 and 1951—years that were marked by peace and prosperity on the one hand, war and depression on the other.

It was early in the year 1901 that seven individuals from Milwaukee and Green Bay, Wis., merged their interest in the new undertaking that was to become the Northern Paper Mills. These founders were Elias A. Bottom, Charles Fisher, F. H. Suffle, M. J. McCormick, Herman Segnitz, T. J. Terp and W. P. Wagner. In 1903 the Milwaukee interest was bought out by the Green Bay stockholders.

In those formative years when the going generally is the most difficult Northern was fortunate in three distinguished respects. The location was excellent from the standpoint of water supply and transportation. Secondly, the directors and officers of the company surrounded themselves with men who were experts in the paper making science. Lastly, records indicate that Northern employes took a genuine interest in the company and did everything within their power to make it succeed.

During the first two years of operation one paper machine was operated. This was a small cylinder type machine which manufactured packages of toilet tissue and also rolls containing 2000 and 5000 sheets. This early package tissue was a forerunner of the present day cabinet tissue and was cut in small packages which were punched at one end and wired so that they could be hung on a nail.

In 1903, John C. Fogarty, a familiar name in Green Bay's history, became general superintendent and manager of the mill. The very next year the second large paper machine was added to production facilities. On this machine a variety of home used paper was manufactured under mill as well as private label for Northern's customers. It was also capable of producing and did produce catalog and newsprint.

Nine short years after the operation had begun it was necessary to expand facilities. The swampy land adjacent to the initial structure was filled in and a number of new buildings and property improvements were constructed. At the same time another new machine was purchased. To provide the pulp used in the manufacture of its paper, Northern erected its own sulphite plant in 1916.

At this stage of its history, Northern employes had increased from approximately 25 to 100. Production was up from 800 to approximately 9,000 tons and Northern Paper Mills was fast becoming a factor in the paper industry.

In the year 1918, J. C. Fogarty died and Perry Wagner became general manager of Northern Paper Mills. Herbert Brightman was in charge of sales. At this time the Northern tissue roll was developed and first appeared on the market.

During the interim period new machines had been added and the sixth paper machine was installed in 1919. Naturally, all the other facilities of the plant had to keep pace since a new building had to be erected for the machine, a new office building was

Figure 1—General view of Northern Paper Mills. Figure 2—The new machine, converting and storage building.

Figure 3—The new machine room. Figure 4—Northern's new Beloit Machine.

deemed necessary, a new digester had to be installed and the groundwood mill was begun. It was completed the following year.

In spite of the fact that Northern tissue was then on the market much of the production left the mill under various private labels. Folded paper towels had been added early to the line and in 1914 roll towels were produced. A number of grades of tissue were manufactured at the mill in basic weights from 10 to 18 pounds. Towels were produced in 25 to 35 pound weights.

In the year 1921, Judson G. Rosebush became general manager of Northern. Mill superintendent was W. A. Kelly and the mills' chief engineer was H. W. Gochnauer who still holds that position. Under their direction in the year 1927, Northern erected its own power plants on the Menominee River. The entire mill was modernized, increasing production to 23,000 tons.

Despite the financial crisis that engulfed the nation in 1929, Northern's confidence in the future was exemplified by the inauguration of a complete modernization program. The company constructed a three story building to house its pulp storage and decker tanks as well as machine and electric shops. Another new building covered the shipping and converting departments and provided storage space for cores and fiber cases. Plant capacity was increased further with the installation of the seventh paper machine capable of turning out 40 tons of paper each day. Frank J. Timmerman became mill manager in that year.

In 1935, Agner B. Hansen became general manager and Milan Boex assumed the position of general sales manager with Herbert L. Nichols as his assistant.

The power plants on the Menominee River were sold in 1938 and a modern steam plant erected here at the mill site. This plant has since been enlarged and today produces all the power needed for the manufacturing process.

With the advent of World War II expansion, of course, was temporarily stopped. The demand for all paper products was great but especially so in the instance of Northern products which through the years have met with the full approval of Mrs. Consumer throughout the nation. Northern's reputation as a mill of integrity was enhanced throughout channels of distribution because of the completely fair and equitable way in which its hard-to-get products were allocated to old customers on the basis of their purchases in prior years. It is interesting to note that because of Northern's consistent and widespread advertising program which never let up since its inception in 1923, Northern products remained on allocation and in short supply long after other tissues were plentiful on grocers' shelves throughout the nation.

Mr. Hansen passed away in 1948 and it was at that time that our president and general manager, Milan Boex, assumed his position.

The old No. 1 paper machine had discontinued operation in 1929 and a new No. 1 machine entered the picture twenty years later. This new Yankee type machine was hardly in operation when in 1950 came the announcement of a new modernization and expansion program. Northern's newest paper machine (the new No. 5) began operation recently in its completely new and modern building. This new building not only houses this huge paper machine but also has room for a similar machine and for the necessary digesters, converting equipment, storage facilities, loading facilities, and expanded print shop and some office space.

The huge machine, believed to be the largest Yankee type, crepe toilet tissue machine in the world, incorporates the most modern innovations known to the industry. It is a Beloit cantilever type Fourdrinier to hold a wire 172 inches wide by 65 feet long. The sidewalls are of heavy stainless steel. Other parts within the wire are likewise non-corrosive. The breast roll is 24 inches in diameter, and there is a stainless steel forming board, with micarta lips. Five table rolls are of the dandy type, and five are rubber covered. Deflectors with micarta lips are located between table rolls. Four Beloit lattice type stainless steel boxes give light weight and maximum strength and are designed to assure maximum drainage. The wire is guided positively and smoothly by the new Beloit air diaphragm automatic wire guide. Wire return rolls are rubber covered. All wire rolls and the breast roll have air diaphragm type oscillating doctors. The bottom couch roll is grooved, and there is a lightweight rubber covered top couch roll. The nip pressure is controlled accurately with special relieving and loading air diaphragm equipment.

Both the first suction press and the suction pressure roll have airloaded packing for maintaining even contact with minimum friction. Both suction rolls are specially designed for high nip pressures and are pressure loaded by means of special diaphragm mechanisms. The pair of wringer rolls provided for each felt is air loaded. Each felt is guided by patented Beloit air diaphragm automatic guides.

The 12 foot diameter Beloit Yankee Dryer is designed for stem pressures up to 125 p.s.i. It is equipped with high speed condensate remover and with sylphon and carbon disc type of steam fits. The steam system is by Midwest Fulton. All three doctors on the dryer are air loaded, and the creping doctor has adjustable blade projection as well as provision for removal and insertion of blades from the front side. The open side calender has two sets of calender rolls, sepa-

rately controlled by air pressure. This is followed by an improved transfer type reel. A Beloit tape type unwinding stand is synchronized with a double drum winder and slitter.

The lubrication system is by Bowser, and the drive is by General Electric. The machine itself is designed for speeds up to 2000 feet per minute, and the winder is capable of speeds above 4000 feet per minute.

This new machine is believed to be the largest Yankee type, crepe toilet tissue machine in the world, with its 172 inch wire and 162 inch trim. Milan Boex, president and general manager of Northern Paper Mills, states the performance of the machine is very satisfactory in production runs and is swiftly approaching its planned average speed of 1650 feet per minute.

A leader in its field, Northern was the first paper mill in the United States to announce plans for the abatement of spent sulphite liquor. The burning process which Northern will install just as soon as possible should enable Northern to reduce the pollutional effects from spent sulphite liquor by 40 to 45 percent. The cost of this installation will approach the $1,500,000 figure.

All this, of course, is a far cry from the tiny installation that first appeared on the banks of the Fox River 50 years ago. Northern not only has its own timber lands, its own ship for transporting logs and is as near to being a completely self-intergrated mill as any tissue mill in the United States today. Very pleasing, of course, is the record of achievement and growth as it pertains to physical equipment, machinery plants, etc. More pleasing, however, and the source of more satisfaction in the hearts and minds of all connected with Northern Paper Mills is the thought that all through the years Northern has always managed to be a good substantial citizen interested in its community and its state but more important, interested in the people who make up the organization and who, of course, are largely responsible for its success.

Hoberg Paper Mills

Ralph C. Pratt

Public Relations Director, Hoberg Paper Mills

Figure 1—Construction of building for new paper machine at Hoberg.

The Hoberg Paper Mills, Green Bay, Wis., one of the larger manufacturers of personal use paper products, is now in the midst of an improvement program expected to cost well over three million dollars.

At present the mill is completely integrated with a Sulphite pulp mill producing 130 tons per day and a groundwood mill producing 20 tons per day. The company's six paper machines produce about 170 tons per day.

A new Beloit Yankee Fourdrinier is now under construction. This machine will have a wire 178" wide, will trim 164½", and will have a maximum speed of 2000 F.P.M. The machine will be designated as No. 1, replacing the first machine installed in the mill which was taken out of service some time ago.

No. 2 machine in Division A has just been rebuilt. This is a Yankee dry crepe Fourdrinier with a wire 102" wide and trimming 94½". The maximum speed is 1615 F.P.M. and the present average daily operating speed closely approaches the maximum. The 10' Yankee dryer was strengthened and refitted to allow the operating steam pressure to be raised from 100 P.S.I. to 125 P.S.I.

The two biggest items in the remodeling of this machine were a new type head box and a new winder which represent well over half of the total expenditure of $100,000.00. Other changes included the installation of a suction pressure roll, new top couch with air operated loading devices and lengthening of the wire table. The winder was purchased from the Appleton Machine Company while the rest of the equipment came from Beloit Iron Works. Installation work was performed by the company maintenance department.

The new stainless steel head box differs from the conventional type in that it uses air pressure in place of a column of water to produce the required velocity at the slice. This results in the requirement of a smaller head box measuring four feet high in place of one which would be twelve feet high for the speeds operated. The head box does not contain the usual dams and passes, stock and flow dispersion being accomplished by a series of rectifier rolls. The unit enables the machine to be operated at increased speed resulting in a general improvement in the formation and quality of the sheet. In addition, on toilet paper grades it is possible to obtain an extra 4½" of trim.

The principal difference in the new winder is the use of score slitters instead of the former shear slitters. This results in cleaner cut edges, especially on the softer grades such as facial tissue.

The new improvements make No. 2 machine the most modern paper machine in operation at Hoberg Paper Mills.

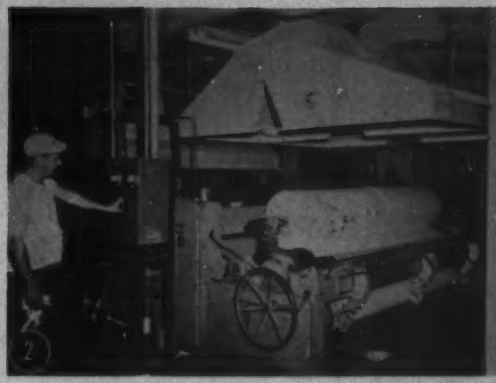


Figure 2—New Appleton winder on No. 2 paper machine. Figure 3—Control station for No. 2 paper machine.

The other paper machines in Division A include three other dry crepe Yankees, two with 133" wires trimming 126 inches and one with 100" wire trimming 94½".

In the company's Division B plant there is one Yankee Fourdrinier with a 114" wire trimming 104" and one conventional Fourdrinier with a 92" wire and trimming 80".

New Saveall for Division A

In the summer of 1949 a Sveen-Pederson Saveall was installed to handle the white water from machines 4 and 5. This was to serve as a trial unit and if successful another similar unit was to be installed to handle white water from machines 2 and 3. The unit proved to be very successful but the rebuilding of No. 2 machine together with the addition of the new No. 1 machine made it necessary to revise the plans for additional saveall capacity. Consequently the new saveall now under construction has almost twice the capacity of the first unit. That is, it will handle 1500 gallons per minute as against 1800 gallons per minute.

The first unit consists of a tile tank approximately 43' long by 10' wide and about 6' high. Effluent from the paper machines is first sent to a retention tank where chemicals are added to induce floating of the pulp fibers. From this point it is pumped to the saveall tank under high pressure which, when released, further promotes floating of the pulp fibers. Finally the mat of stock is scraped off the water surface automatically and is deposited into a small tank. The stock eventually is pumped back to the beaters and the remaining white water is returned to the paper machines for reuse.

The new saveall is 50' long, 16' wide and about 6' deep. The construction is similar to that of the first unit.

Before the installation of the Sveen-Pederson Savealls the white water effluent was processed in cylinder type savealls. These units were able to reduce the effluent loss from about 4 lbs. per 1000 gallons to 2 lbs. per 1000 gallons. The Sveen Savealls now reduce the effluent to approximately .3 lbs. per 1000 gallons.

Figure 4—Lower portion of one of new hydrapulpers showing drive.

Division A Pulping System

Now in operation for several months, the central pulping system provides uniform furnish for all paper machines in the Division A plant.

The system consists of two fourteen foot diameter hydrapulpers, located in a basement room below the first floor of the plant. They replaced the beaters formerly in use on the four paper machines.

The new units, manufactured by the Shartle Brothers Company, are about 14' in diameter and about 15' high. The pit in which they are housed measures approximately 50' in length, 30' in width and 15' in height. Final cost including installation construction was about $96,000.

To provide rapid filling of the pulpers and at the same time make good use of substantial quantities of white water, three tile white water tanks were built on the floor directly above the pulpers. These tanks provide a constant source of white water in a short time for rapid filling of the pulpers.

Figure 5—Hydrapulper loading floor and control station.

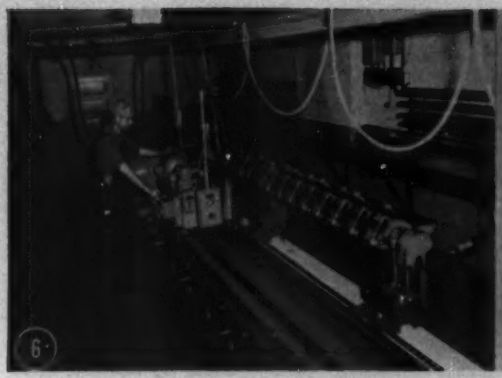


Figure 6—New Hanchett knife grinder. Figure 7—Automatic toilet tissue roll rewinder wheel is still in experimental state.

PULP MILLS

The sulphite pulp mill is equipped with four digesters that produce a total of 130 tons of pulp per day. Of this total about 95 percent is bleached, the balance being used in the unbleached state. In the fall of 1949 a new single stage continuous bleaching system was installed.

Bleached Stock Storage Chests

Two new sulphite storage chests are now operating in the sulphite mill. The chests, located on the first floor of the mill below the Kamyr machine, were built by Chemical Linings, Inc., of Watertown, New York.

The chests are about 12′ wide, 30′ long and 19′ high. Their capacity is estimated at five tons of stock. They replace two smaller wooden storage tanks which were declared obsolete some time ago.

The purpose of the chests is to provide storage space for stock coming from the bleach plant. From the chests the stock is pumped to the division B paper mill or sent to the Kamyr machine to be lapped and delivered by truck to division A.

GROUNDWOOD MILL

The groundwood mill has two four packet grinders, each of which produces about 10 tons of pulp per day.

New Maintenance Machine

The work of grinding blades and knives is now being performed by a single machine at division A. For this purpose the company recently purchased a hydraulic knife grinder from the Hanchett Manufacturing Company of Big Rapids, Michigan at a cost of about $17,000.

When operating at full capacity, the new machine is capable of handling all of the work formerly assigned to three small grinders scattered around the plant.

The knife grinder has a special device which enables it to grind eight doctor blades simultaneously within a space of 15 minutes. The old grinders handled only one blade at a time. In addition to doctor blades the machine is equipped to service chipper knives, reamer blades and hog knives.

A room to house the knife grinder was built in the division A plant and a full time operator has been trained to handle the work from both divisions.

CONVERTING DEPARTMENT

All of the paper produced at the company's two divisions is converted in the division A building. Finished products include rolls and packages of toilet tissue, package napkins, and kitchen towels for consumer use as well as roll and folded toilet tissue and paper towels for industrial use.

New converting equipment for the continuous winding of toilet tissue rolls are in the process of development. Continuous winders of this type have been furnished by both the Hudson Sharp Machine Company and the Paper Converting Machine Company of Green Bay.

On one such machine the finished rolls are automatically stripped from the shaft to a conveyor. The core shafts remain in the machine. The only operation that must be performed by the operator is to place the cores on the shafts, thus it is possible to operate it at high speeds with a single operator.

This automatic stripping winder takes mill rolls up to 63″ in width, slits the web into 4½″ widths, perforates each strip to form the individual sheets in the small rolls. Full length cores are slit to the 4½″ width on the machine. When the small rolls on a shaft reach the proper size, the webs are automatically cut and a flying transfer is made to the next shaft of cores which is in position.

All of the toilet tissue and towel roll cores are made in the mill. With the addition of continuous winding equipment which provides for use of long cores on the shafts it became necessary to purchase additional core making equipment. Manufactured by the Paper Converting Machine Company, a machine was developed to produce long cores at a higher rate of speed than with the old machine. An additional advantage is the sharp clean cut on the ends. The speed was increased from 142′ per minute to 160′ per minute with the installation of the new unit. It produces spirally wound two ply cores, 1½″ in diameter. The core is made in a continuous tube that may be cut to any desired length.

Storeroom

A new storeroom for the division B plant has been in use for several months. This new building is 81′ long by 63′ wide by 15′ high and is about twice the size of the old storeroom. The former facilities were housed in a section of a building which included the old laboratory and offices, all of which are now being razed. The new storeroom is much more conveniently located being closer to the machine shop, pipe-fitting and welding departments.

Laboratory

The new laboratory, under construction since 1950 has just been placed in operation.

Designed to centralize types of work formerly conducted in separate locations, the $100,000 project contains a sulphite laboratory, main laboratory, conference room, library and other rooms for specialized work.

The new building also contains offices for the sulphite superintendent, time keeper and first aid department. Another section of the building is devoted to a clock room for all division B employes. This room contains chromium furniture including chairs and tables which may be used by employes coming in or off shifts.

Employe Lounges

Facilities for employes were not overlooked in the expansion program. For several months division A employes have been enjoying the use of

Figure 8—Backstands for facial tissue rolls being cut and folded for packaging.

Figure 9—New high speed automatic core machine.

a new lounge. The room, which measures 55 feet long and 20 feet wide, is equipped with chrome furniture.

Fluorescent lighting and a ventilating system have been provided so that workers may spend their leisure time playing cards or reading. The furniture includes enough chairs and settees to seat over fifty people. Card tables, magazine tables and ash trays comprise the remainder of the equipment.

This room along with the combination clock room-lounge in the division B plant are the main recreation centers for employes. In addition, small card rooms equipped with chromium furniture have been placed in the maintenance departments where employes can eat their lunches.

Washroom renovation was another of the major projects in the program for employe consideration. New tile showers and toilet facilities have been installed in several locations and remodeling of old washrooms is nearly complete.

Location of Two Plants

The Hoberg division A plant is located on a six acre tract on the north bank of the East River. It contains four paper machines, a label-printing, and shipping department and a converting department which handles the output of all of the paper at both mills.

The division B plant is situated on a ninety-four acre tract on the east bank of the Fox River. It has a developed water-front, a modern dock, an expansive yard for the storage of pulpwood, a sulphite and groundwood pulp mill and two paper machines.

The firm has been in existance since 1892. At that time it was known as the John Hoberg Company and consisted of a small waterpowered one machine mill in Kaukauna, Wisconsin. In 1895 the John Hoberg Company brought its 72" cylinder type machine to Green Bay on the present site of the division A plant.

By 1900 product demand permitted the addition of a second paper machine and this was followed in 1903 by the installation of No. 3 machine. As plant equipment and personnel were enlarged so were the company's products and markets. Crepe paper manufacture was started and its acceptance by the public gave the company wide product distribution. This acceptance permitted the construction of No. 4 machine in 1910.

Expansion of plant and facilities was further developed by the merger of the John Hoberg Company with the Green Bay Paper & Fibre Company in 1922. The consolidation became known as the Hoberg Paper & Fibre Company. It then owned and operated a sulphite mill as well as two additional paper machines.

The reorganization of 1925 revealed a need for modernization of equipment and a reduction of production costs to meet the competitive conditions in the industry. J. M. Conway was elected president and general manager of the firm and under his direction the organization has progressed to a recognized position in the sanitary papers field.

LIST OF SUPPLIERS

Automatic Case Sealer, Standard-Knapp Mfg. Co.

Fourdrinier, Beloit Iron Works.

Hydrapulpers, Shartle-Dilts-Black Clawson.

Lava-Dock Equipment, Rotary Lift Co.

Paper Machine Hood and Ventilating System, J. O. Ross Eng. Co.

Paper Machine Winder, Appleton Machine Co.

Powell River Development Program at Half Way Mark

Powell River Co.'s latest $12 million development program, started last year and due for completion next year, is making good headway despite certain shortages and curtailments of materials. Original schedules will probably be set back a few months, but the middle of 1952 should see the program near full operation.

Basic purpose of the present program is the speeding up of paper machines to produce an estimated 130 additional tons of newsprint daily sometime in 1952. At present the plant turns out an average of 1,000 tons of newsprint and about 140 tons of unbleached sulphite pulp.

The present Powell River program involves 11 separate projects, as follows:

New Wharf Construction

The new wharf, which will replace old wharf "A" is a steel piling structure with a fill between the piles. A creosoted timber apron will be built outside the fill. To date piling has

New wharf construction.

been practically completed and filling operations over half done. Work on warehousing will start later in the summer.

Steam Plant

Steam plant conversion is one of the major operations in the program. It involves construction of a new building, and the installation of an eight boiler unit. This unit is a B & W type, burning hog fuel, with a rated capacity of 150,000 pounds of steam per hour, a figure that will likely be exceeded under operating conditions. A 12,500 kilowatt steam turbine, built by Brown-Bovere of Switzerland will be included in the new set up. A separately fixed super heater will be installed in connection with No. 7 boiler. At present, excavation work for this construction is proceeding steadily. Incorporated in the new steam plant building will be an electrical sub-station.

New construction—chip silos.

Groundwood

Site cleaning operations for the new extension of groundwood facilities are well under way. Two Waterous, Great Northern 64" grinders are on order for this job.

No. 5 & 6 Paper Machines

These will be speeded up to approximately 1500' per minute, and work on installation of the new G-E electronic drives has started.

No. 3 & 4 Machines

These will be speeded up to approximately 1100' per minute and the Harland Drives now on 5 & 6 machines being replaced by General Electric, will be used to replace the line shaft drives now on 3 & 4 machines.

No. 7 Machine

Will be slightly speeded up to over 1600.

Hog Fuel Unloading

The present wharf "B" will be modified for use in the unloading of hog fuel. A new Colby travelling crane of Boston tower type will be installed.

Chip Silos

The extension of this building 40' x 85' has been almost completed. The main silos have been poured and work on the conveyor housing is progressing well.

Transmission Line

This work involves the replacing of the existing single circuit pole line between the Lois River generator house and Powell River by 84, 6 conductor double circuit steel towers, covering Lois River output at 66,000 volts.

Average height of the towers are 85' and the average span is 900'.

Electrical Distribution System

This represents one of the major electrical overhaul jobs in Canadian industry. It will comprise the erection of an electrical loop of about one mile around the plant at Powell River. Power at 6600 volts, on a 6 conductor loop will be carried on 22 steel towers each 50 feet high. Power will be distributed to five sub-stations and stepped down to the distribution voltage of 2300 volts.

A feature of the new system will be the main control center located in the new steam plant extension. Here a load dispatcher will exercise remote control of all phases of electrical distribution. Comprehensive communication system will form part of this set up. A complicated and extensive series of cut overs will be required to ensure continuance of operations during installation.

Other work includes hog fuel storage extension, revisions to screen room, etc.

The present program at Powell River is a continuance of the big Post War Development and Expansion Plan started in 1944. Between this date and 1952, the company will have plowed back nearly $30 million into its plant and properties.

In 1946, a major unit, the new hydraulic barking and whole log chipping plants were installed. In September 1948, Powell River's Number 8 newsprint machine, capable of ultimate speeds in excess of 2,000' a minute went into production, and last year early in 1950, sawmill modernization was completed.

Construction of steel towers for new transmission line.

Mando Modernization Story

G. N. Williams
Director of Industrial Relations, Minnesota and Ontario Paper Co.

Minnesota and Ontario Paper Co.'s long-range planning and development program, begun six years ago, and designed to diversify production and modernize plant facilities, was further implemented in the past 12 months by the addition of several important improvements.

These include the placing in commercial operation of a Mando-designed coating machine, the construction of a groundwood bleachery, and the installation of a new sulphite screening system, electrostatic precipitator and coal handling facilities at the International Falls, Minn., plant; the construction of a new woodroom, modernization of the screen room and replacement of the Briner economizers on one of the paper machines at the Fort Frances, Ontario plant; and the conversion of boiler facilities to lignite operation and replacement of the Bird screen system on one paper machine at the Kenora, Ontario plant.

Previous to 1950, and extending back to 1945 when the long-range program of modernization was first initiated, a series of projects was completed which enabled Mando to produce the expanded range of pulps necessary for product diversification into the high-grade specialty field.

Principal items added during this period were a 15 million gallon capacity water filtration system, a 200-ton-per-day capacity kraft-sulphite bleach plant, a bark disposal plant, a forest products research laboratory, supercalenders and auxiliary paper finishing equipment, modernization of two paper machines, and rehabilitation of pulp preparation and refining equipment. Extensive modernization of the Insulite insulation board plant, including installation of a fourth machine, was also accomplished in this period, with resulting increase of something more than one-third in Insulite production capacity.

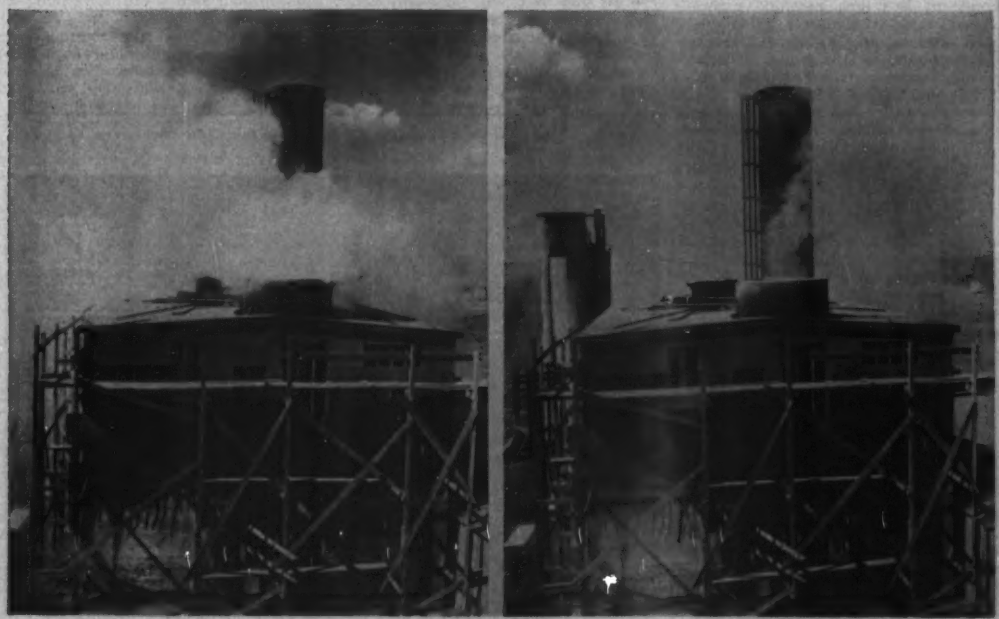
Plant Improvements in the Past Year International Falls

Mando Coater—Some paper coating was done a few years ago on a Waldron coater. While this was being used, experimentation continued on a coater designed and developed by our research department and built by the Beloit Iron Works.

The new machine is of the reverse-roll type set up as an off-the-machine coater. It is patented in the United States and abroad. As it is set up, the coater follows a Kohler unwind reel and flying paster which takes a full reel from one of our paper machines. Following the coater is a drying section and a standard Pope reel, from which the coated stock is transferred to an unwind stand; from there it goes to the supercalenders.

The color mixing equipment is in the basement underneath the machine, which is located on the foundation of the former No. 1 paper machine.

Figures 1 and 2—Effect of the Mando salt cake precipitator on gases that flow from the kraft mill stack is illustrated in "before" and "after" pictures. Photo at left shows billows of dust-laden gases emerging with precipitator in "off" position. Photo at right was taken a few minutes later after unit was turned on to capture salt cake particles that otherwise would escape with the hot gases. Note that fumes in picture at left obscure the acid tower, which shows plainly in the second photo. Building with scaffolding is temporary structure housing the precipitator mechanism and will be removed.



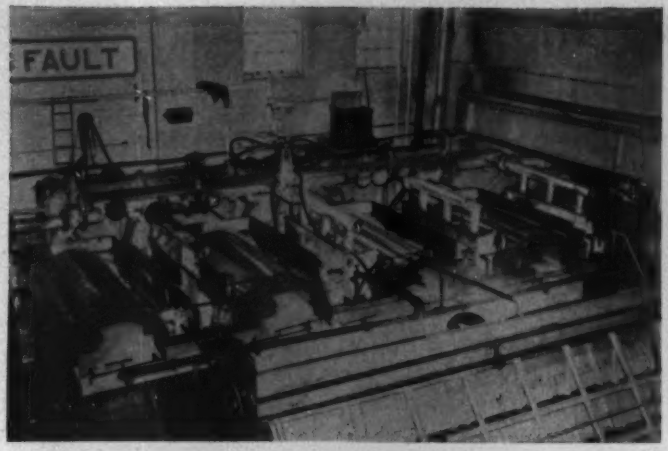


Figure 3—These five new screens on Number 9 machine take the place of six of the older type which had been in operation since the mill began. This installation was done in such a manner that no machine time was lost in the change-over.

The coater is driven by a multi-motor D.C. drive and is being operated at speeds upward of 1,000′ per minute, although demonstrations have proven that it is capable of operating at much higher speeds. The machine width is 142", designed to take the full width sheet from our No. 2 paper machine.

Groundwood Bleachery — Nearing completion at the Falls is a 75 ton groundwood bleachery installed in the same building with the kraft and sulphite bleaching equipment. This is designed to use either the sodium peroxide or hydrogen peroxide process. A tile-lined, 45′ diameter by 45′ high tank assures cleanliness and adequate pulp storage for the paper machines. Groundwood pulp for bleaching is supplied unscreened from the Fort Frances mill. Cowan screens and Shartle hydraclones remove grit and dirt before deckering.

When the new groundwood bleachery is completed Mando will have facilities by which eight types of pulp can be manufactured. The seven pulps already in production are unbleached groundwood pulp, unbleached and bleached soft wood sulphite, bleached hardwood sulphite, and unbleached, semi-bleached and bleached sulphate pulp. Few if any mills on the continent enjoy the flexibility and diversification of operations which Mando will have with these eight kinds of pulp available.

Sulphite Flat Screens—In the process of converting production facilities at the Falls mill to the manufacture of specialty and high-grade papers, it was found that the sulphite screening system was inadequate. Designed for handling comparatively coarse stock, it required extensive improvements if a finer pulp—free of dirt, grit and other foreign matter—were to be obtained.

Consequently, Mando undertook major alterations in its sulphite stock system. Outmoded knotters and rotary screens were replaced with 24 modern flat screens. These units were completed last October and were found to be not only more efficient but also to require less maintenance and to consume less power in relation to their output capacity. The new system is able to handle the total production of sulphite pulp amounting to 168 tons in 24 hours.

The flat screen layout consists of 12 lines of 14 plate screens, two per line. The screens are fed from a cypress flow box, with manually controlled gates regulating the flow to each line of screens. All piping for handling the stock and water is of stainless steel. With emphasis on cleanliness, every precaution is taken throughout the process. Stock from the reject screens is utilized in the manufacture of Insulite.

Further improvements include three Jonsson shaker-type knotters, tile lining and agitation in the stock storage chest that feeds the screens and replacement of the pneumatic deckers with two vacuum filters.

The flat screens and vacuum filters were supplied by the Improved Paper Machinery Co. of Nashua, N. H. The design and layout of the screening system was prepared by the Mando engineering department in collaboration with the operators. Mando maintenance crews erected and installed the screens.

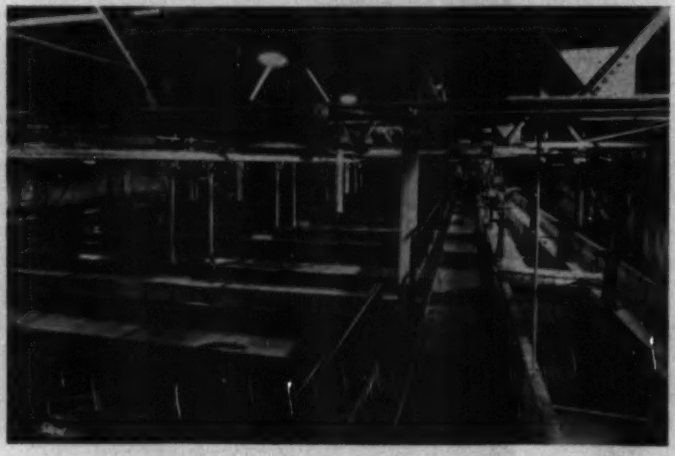
Coal Bunker and Coal Handling System — A newly constructed brick building, 294′ long, 19′ wide and 63′ high, houses new coal handling facilities, including a coal bunker with a capacity of 2,200 tons, for the Falls steam plant.

This installation was designed by Mando's engineering department and gives Mando one of the most modern and efficient coal handling systems in the country. Coal now moves from the railway cars to the boilers with no manual labor required.

The bunker, a semi-elliptical steel storage bin, is lined with a two-inch coat of "gunite" for protection against the corrosive action of the coal due to its moisture and sulphur content.

Directly across from the new building is a track hopper with a level capacity of 25-30 tons. Coal is dumped directly into this hopper from railway cars. The coal then moves on an apron feeder into a crusher having a capacity of 150 tons per hour. An inclined belt conveyor takes the fine coal from the crusher through a tunnel underneath the tracks to two bucket elevators at the west end of the

Figure 4—Greater Cleanliness of stock results from these new sulphite flat screens at the Falls mill.



bunker building. Each elevator has a capacity of 75 tons an hour.

From the top of the elevators the coal moves by conveyor belt through a travelling tripper which dumps into the storage bin at any desired point. When needed for the boilers, the coal is released from the gates on the bin into one of two three-ton weight lorries suspended on rails running the full length of the bunker. Coal is fed into the weigh lorries through 45 bunker gates located at intervals of six and one-half feet. In the old bunker gates were placed at much wider intervals and, as a result, coal would often hang up and have to be shoveled into the gates by hand. The coal is weighed in the lorries and then moved to the hoppers of the pulverizers for feeding to the boilers.

Electrostatic Precipitator Unit—The presence of salt cake dust in the atmosphere, a major source of annoyance to the residents of the Falls community in the past, has been virtually eliminated by Mando's new electrostatic precipitator.

The precipitator unit, installed on the roof of the kraft mill, now recovers more than 95 percent of the salt particles that formerly entered the atmosphere.

To correct this condition, as well as to prevent the waste of a valuable raw material, a precipitator unit was purchased from the Koppers Co., Inc. Working under the supervision of the erecting engineer for the Koppers Co., Mando maintenance crews assembled and permanently installed the equipment.

The installation of this recovery equipment is another step toward more efficient and economical operations. The reclamation of salt cake dust represents a saving in money to the company and in addition, the community benefits by the elimination of dust that originated in the kraft mill.

Power Substations—An addition to Mando's electrical distribution system at International Falls has been completed with the installation of three new unit type load center substations. These include two 2,000 KVA transformers and one 1,500 KVA transformer. The former serve the operation of the paper mill machinery and the latter provides mill lighting service.

The new substations, coupled with those already in service, provide sufficient capacity for present needs of the mill lighting system and production machinery and will also handle projected expansions in electrical service in the mill. The units have also eliminated the overload which formerly existed.

The first of the new units, the two 2,000 KVA substations, supplemented a 2,250 KVA transformer which previously served the paper mill and which was operating at a 20 percent overload. The two new units have given Mando the needed capacity that will be required to supply the coating operation and additional stock refining equipment. They also released the old transformer to serve expanded barking facilities.

The third unit, the 1,500 KVA substation, supplements a 35-year old 4,500 KVA transformer and low voltage switching facilities which served the mill lighting and other power loads. The advanced age of this equipment, and the excessive load it was carrying, led to the installation of the new unit. The 1,500 KVA, used exclusively for mill lighting service, now provides a dependable mill lighting supply, independent of all other power services, and has reduced the load on the older units, thus increasing their useful life.

Fort Frances, Ontario

Wood Room and Wood Handling Facilities—Two more important steps in the modernization of the 300 ton paper mill at Fort Frances are presently underway. These include construction of a completely new wood room started in April and modernization of a second paper machine. Both are part of Mando's continuing program of investment in new and improved facilities.

A new wood room of brick and steel construction will replace the present facility which has been in use since the Fort Frances mill was built in 1914. The new building will contain four large drum barkers of 12′ by 45′ size replacing six old 10′ x 30′ barkers. Pulp wood will be taken from the Rainy River at a much more favorable location, and a wood conveyor 360′ long will be constructed for unloading truck and rail wood. Bark from the new wood room will flow by gravity to the existing bark press room which in turn will be modernized with new screens and a new bark press.

Wood room employes will also enjoy improved facilities including enlarged locker and shower rooms and a modern lunch room.

No. 5 Paper Machine Modernization—Improvements to No. 5 paper machine will increase speed by approximately 400′ per minute. The production range will be from 200′ to 1,200′ per minute compared to the existing maximum speed of 800′ per minute.

The three paper machines of the Fort Frances mill are presently averaging 328 tons of paper per day. To this total No. 5 contributes approximately 75 tons per day at the present time.

The modernization of the No. 5 machine will be similar to that completed in 1949 when No. 6 paper machine was almost completely rebuilt. Six new dryers will be added to the No. 5 machine. A removable Fourdrinier section is to be installed as well as new suction presses and a smoothing press; and a Harland sectional electric drive will replace the old American Ball steam engine which has been in service since 1914. Minor adjustments will also be made to the calender-stack. A new water-cooled Pope reel will be installed, and a new Cameron winder with regenerative electric drive will complete the installation.

Figure 5—Power pack that supplies electrical energy for the precipitator is the "heart" of the new kraft mill installation. It rectifies and steps up 550-volt alternating current into the 60,000-volt direct current needed to energize frames and plates that catch salt cake particles as they pass through the gas stack chamber.

In addition, new broke beaters have already been installed on No. 5 and 6 machines and improvements have been made in the screen room.

Kenora, Ontario

Conversion to Lignite Operation—The installation of a Foster Wheeler Spreader-type stoker in the No. 2 boiler unit was completed last November. This was the fourth and final unit thus converted in the Kenora steam plant. Considerable savings are

Figure 6—Last remaining sections of scaffolding on brick structure housing Mando's new coal bunker and coal handling facilities.

expected through the use of lignite and by the more efficient operation of the new stokers.

The new installations involved tearing out the old under-feed stokers which had been in service since 1925, and changes to the steel and brick work of the boiler units.

The new stokers embody improved features for production of steam. There are no moving parts within the furnace. The addition of water cooled walls effectively protects the furnaces from excessive temperatures and provides additional steaming capacity. These features are important factors in keeping maintenance and repairs to a minimum, thereby increasing the efficiency of steam production.

Ash Handling System—In accomplishing the stoker conversion project, it was necessary to modify the existing ash-handling system to effectively take care of the light ash resulting from the burning of lignite. The old ash-handling system was unsuitable for handling 100 percent lignite ash from the four spreader stoker furnaces. Previously it could be handled by wetting down, since it was mixed with clinkers from the underfeed stokers and did not hang up in the ash bunker. Wetting of the 100 percent lignite ash was not practical since the ashes would pack solidly in the ash bunker.

The solution of the ash problem was solved by installing a Nuveyor Pneumatic Ash and Fly-Ash Conveyor with a Rotary Dustless Unloader. The ash and fly-ash is removed pneumatically through 8" and 6" lines to the ash bunker, and is unloaded from there by means of the dustless unloader to rail cars. Vertical lifting doors and enclosures on the twelve ash pit hoppers of the four boiler complete the installation.

Maintenance costs on the new spreader stokers are negligible in comparison with old type equipment. Value of inventory of spare parts carried in stores is reduced due to the simplicity of the spreader stokers and the low cost of spare parts.

Bird Paper Screens — The original speed of No. 9 paper machine at Kenora was about 900′ per minute. When first built there were five Type 2 Bird Screens supplying the head-box. Some three years later, as machine speed increased, it was found necessary to add one more screen to the existing five, this being a Type 2A, a slightly newer model. By the fall of 1950, the original five screens had seen twenty-five years of service and had reached a stage where the cost for maintenance was excessive.

The decision was made to replace these screens and Mando purchased from Canadian Ingersoll-Rand five new Bird screens of Type 3A-100. From September to November, 1950, the old screens were removed one by one, and replaced by the new improved type. Number 9 machine was operated during the entire installation.

After the new screens had been installed, the average speed was stepped up and production increased by 4 tons per day.

This fall, it is planned to replace the Bird screens on No. 8 machine with five new ones, of the type installed on Number 9 machine. Management believes that the expected increase in operating efficiency will more than justify the expense. The increase in daily tonnage will also contribute to the over-all effort of the industry to meet the need for more newsprint.

Other Improvements—Other important improvements and additions underway at Mando mills at the present time include new Briner economizer systems for Nos. 2, 3, and 4 paper machines, sectional electric drives for Nos. 2 and 3 paper machines, an addition to the Insulite warehouse, and a new storage and loading building for the stores department at the Falls mill. At the Kenora mill, six Warren grinders are being widened and, as previously mentioned, new Bird screens are being installed on No. 8 paper machine.

Paper Machine At Potlatch Forests, Inc.

Among the many outstanding installations of Rice Barton equipment which have taken place since the early Fall of 1950 is the installation of the Rice Barton Fourdrinier type paper machine at Potlatch Forests, Inc., Lewiston, Idaho.

This machine has incorporated in it many modern improvements and unique design features.

The machine is designed to operate at a minimum speed of 100 ft. per minute up to a maximum speed of 1300 ft. per minute, having a wire 216" wide x 120′ long.

A Rice Barton stainless steel flow box and slice is provided. The stock enters the flow box through a manifold and Rice Barton special system of straight-flow pinch-type valves.

The slice is especially designed to operate in conjunction with the Rice Barton patented duplex breast roll arrangement. After-slices and deckle sides are used for heavy weights and slow speeds.

Ten and one-half inch diameter table rolls are mounted in Rice Barton patented rubber mountings. Table roll deflectors which are rotatably adjustable are provided as well as a specially constructed rapid draining wire board.

The machine has eight hydraulically oscillated flat suction boxes with an electrically driven dandy roll located in the suction box section. The electric drive of the dandy roll is synchronized with the mechanical drive unit of the couch roll.

A lumpbreaker roll operates in conjunction with the suction couch roll and is equipped with a pneumatic loading and lifting device.

All return wire rolls are stainless steel covered.

A series of three Rice Barton shake heads driven by a variable speed motor, impart the shaking motion to the Fourdrinier. Stroke is adjustable while the machine is running.

The Fourdrinier is an improved Rice Barton removable type—one of the features being that the Fourdrinier is rolled forward two feet and then lowered on roll-out beams and removed to the tending side-aisle for stringing the wire over the pit. Another unique feature of this Fourdrinier is that the breast roll, breast roll doctors, table rolls, etc., are removable as a unit, which saves a large amount of time in readjustment upon completion of the wire change, and also reduces the amount of work necessary to prepare for the removal of the Fourdrinier.

The press section is equipped with the Rice Barton system of hydraulic loading which makes it possible to raise, lower, create pressure or float the top press roll by the movement of one handle of one valve at each press. The hydraulic power unit for this equipment also supplies power to the hydraulic oscillator units for the press roll doctors. The conventional smoothing press which follows the press section is likewise equipped with this hydraulic loading feature.

The dryer section is three banks separated by a breaker stack and a size press.

Dryer gearing is totally enclosed and lubricated from a central oiling system—this oiling system also providing circulating oil to dryer bearings

Upper Left—Flowbox Rice Barton Potlatch Machine. Upper Right—Wet-end Potlatch Machine. Lower Left—Press Section Potlatch Machine. Lower Right—Winder Potlatch Machine.

Potlatch Forest Refining System

The stock preparation system of Potlatch Forest, Inc. includes a line-up of four large E. D. Jones & Sons Company Hi-Speed Beaters followed by five Jones Majestic Refiner-Jordans and Jordans. The units are located in a line on the machine room floor just behind the head box, and easily accessible to the machine tender. This system is designed to give the operators enough flexibility to prepare a reasonably wide range of grades. . . . The four Beaters each with the 3,000 pound tub capacity are large enough to allow the making up of any contemplated furnish and in addition to perform the initial stock preparation. They are driven by 200 HP, synchronous General Electric motors. Following the Beaters there are three Majestic Refiner Jordans which in turn are followed by two Majestic Jordans—all of the latter units are driven by 400 HP, General Electric Synchronous motors. . . . It is possible by varying the amount of work done in the Beaters, Refiner Jordans and Jordans, and changing stock consistency, to produce a fairly wide range of product quality. . . . The broke is repulped in an E. D. Jones & Sons continuous extraction breaker Beater located in the basement under the dry end of the paper machine.

and felt rolls. All doctors on this machine are of Rice Barton patented design.

All dryer felts are guided by patented Ziegler type units. These Ziegler type felt guides are unique in that there are no ratchets, pawls, air valves, pivot points, and no moving parts to the guide when the dryer felt is running central. When the felt runs to one side of the machine then a rotating head on the guide is activated by the felt and displaces the guide roll, returning the felt to its normal position.

Following the dryer section are two eight-roll Rice Barton calender stacks equipped with antifriction bearings on all rolls including the bottom rolls. These are equipped with electrically driven reversing drives.

Following the calender stack is a Rice Barton uniform speed reel with a 60" diameter drum so designed that a patented sheet tempering device may be added. All motions on this reel are hydraulically controlled and a Rice Barton hydraulic braking mechanism prevents the coasting of the Jumbo roll when it is removed from contact with the winding drum.

Unwinding stands are equipped with the latest design of electric regenerative braking mechanism. The connection between the brake and the reel spool is a pneumatic arrangement utilizing a Jordan type Fast flexible coupling which has a 9" travel. This arrangement eliminates the necessity of the operator making provision for crosswise as well as angular adjustment, such provision being made automatically by the mechanism.

The Rice Barton heavy-duty two-drum winder is equipped with 22" diameter drums, roll ejector mechanism and rider roll. Each winder drum has a separate motor drive and the rider roll is equipped with a hydraulic counter-balancing mechanism.

The slitter unit is a high speed shear cut arranged unit with the top slitter being the Rice Barton patented arrangement, while the bottom slitters are mounted on one continuous shaft and are synchronized with the main winder drive. The electric driving arrangement for this winder has ample capacity for the winding of counter rolls.

The machine is equipped with thirteen individual hypoid gear drive units, each unit being equipped with Fawick Airflex clutches. At the dryer drives, specially designed additional Airflex clutches are used as brakes for stopping the high inertia sections.

The belt guides of all units are motor operated and have ball bearing roller-type fingers in contact with the edges of the belt.

On the calender and reel drives, the belt shifters are equipped with an air operated mechatnism for quick draw adjustment for controlling sheet tention at paper breaks or when passing paper through these units.

Wisconsin Stream Improvement

APPLETON, Wis. — Wisconsin pulp mills now have in use or on order approximately $10 million worth of equipment for reducing sulphite liquor pollution in streams. This estimated total does not include the expense of formal research or of programs that have been abandoned as impractical, according to the Wisconsin Pulp & Paper Information Service.

More than half of the estimated total consists of projects to evaporate spent sulphite liquor and burn it or put it to other uses. Three Fox river mills—Hoberg Paper Mills and Northern Paper Mills at Green Bay, and Consolidated Water Power and Paper Co.'s Interlake mill at Appleton—have state approval on their plans for evaporation and burning plants, and are under orders to build and have these in operation by December 31, 1951. These three mills alone have committed more than $4 million to this purpose, and Interlake has recently installed a cyclone-type furnace of revolutionary design which has successfully burned concentrated liquor on several test runs.

But all three programs are currently bogged down in unavoidable delays caused by their inability to get federal priorities for scarce metals which national authorities are channeling into defense industries. Evaporators to handle spent sulphite liquor require a special grade of stainless steel containing molybdenum, and defense industries already hold government priorities for more molybdenum than the available supply.

Several other Wisconsin mills have carried their combustion tests to considerable lengths. Kimberly-Clark Corp. has had two major trials at its Niagara mill. Badger Paper Mills of Peshtigo rebuilt two of its boiler plant furnaces to burn liquor. Nekoosa-Edwards Paper Co. of Port Edwards has done a great deal of work in this field.

Rhinelander Paper Co., even before pollution in the Wisconsin river had received official attention, placed its orders for an evaporator and the necessary accessories in September, 1950. This was several months before the effective date of the Fox River Valley mills' orders to submit their plans to the state Committee on Water Pollution. Rhinelander, therefore, seems likely to have its evaporator installed before any other mill in the state. Rhinelander reports that delivery dates are still indefinite on some items, foremost among these the stainless steel evaporator. Consequently, Rhinelander states that despite its efforts to get its evaporating plant to work as soon as possible, this plant cannot possibly be placed in operation this summer.

Four companies have undertaken major experiments involving substantial changes in equipment to try out the ammonium-base process of making sulphite pulp. This is primarily a search for hoped-for advantages to be gained in evaporating the spent liquor with less scale than comes from the conventional calcium-base process, and also in burning the concentrate with less fly ash. Of these, Wausau Paper Mills Co., Brokaw, has been operating its entire sulphite mill on the ammonium-base process since last November, and Consolidated Water Power & Paper Co. has been solely on ammonium-base at Wisconsin Rapids since early in August.

Largest single equipment now operating in the state for reducing sulphite pollution is Marathon Corp.'s huge plant at Rothschild, where chemical products including vanillin are recovered from spent sulphite liquor. This unit has been operating for several years. Investment by Marathon and others in chemical recovery projects is substantial.

The experimental plant of Rhinelander Paper Co. for treating spent sulphite liquor with torula yeast to reduce its effect in polluting the stream has been operating for nearly three years, and has proved the process an operating success, though the mills still reserve judgment on whether it is economically feasible. This plant was built by the Lake States Yeast Corp. with funds supplied by the mill members of the Sulphite Pulp Manufacturers' Research League, and is operated experimentally to provide operating data for these mills. The yeast plant costs more than $500,000, and is currently erecting a plant addition in expectation of improving effectiveness of the process.

Use of spent sulphite liquor as road binder has gained wide acceptance during the past year. Nine Wisconsin mills now employ this non-pollutional method of disposing of the material, and their total investment for the purpose approaches half a million dollars.

The industry's estimates of pollution-reducing installations now in use or on order by Wisconsin sulphite pulp mills are as follows:

Change over from calcium to ammonium-base	$5,545,000
Chemical Products	3,500,000
Yeast Process	500,000
Roadbinder	450,000
Other	10,000
	$10,005,000

PRICES

The prices below reflect market quotations in New York at the mill level on standard grades. Does not include spot offerings.

PAPER AND BOARD

Standard News, Delivered Ports

Rolls, contract, per ton	‡ $114.00/116.00
Sheets	130.00/ —

F.o.b. Mills, C.l. Frt. allowed, dock, N. Y.

Kraft— per cwt., 40# base wgt.

Standard Wrapping Rolls	$7.75/ —
No. 1 Wrapping Rolls	8.25/ 8.50
Standard Bag	7.50/ —

Tissue— per ream 24x36 (480) 10 lbs. 3500 lbs or more

Wh. No. 1 Frd.	$2.25 /$2.35
Wh. No. 1 MG	2.25 / 2.40
Wh. No. 1½	1.95 / 2.05
Wh. No. 2	1.75 / 1.85
Kraft Anti-Tar 20x30	2.12 / 2.25
White Anti-Tar 20x30	2.20 / —

Toilet— per case of 100 rolls—1 M sheets

Unbleached 4½x4½	$8.00/$8.25
Unbleached 4½x5	6.60/ —
Bleached 4½x4½	10.00/12.50
Bleached 4½x5	9.85/ —
Per Case of 50 roll—2000 sheets	
Unbleached 4½x4½	$8.00/$9.75
Bleached 4½x4½	6.95/ —
Per Case of 100 rolls—1000 sheets	
Facial, 4½x5, 2-ply	$8.95/10.45

Paper Towels— per case of 3750

Wh. Jr. M'tif'd 9½x9½	$6.40
Br. Sr. M'tif'd 9½x12	4.10
Br. Jr. M'tif'd 9½x9½	3.90
Br. Jr. Sgl. fold 9½x10½	3.95
Bldd. 7½x11, 24/25 rolls	$7.00/7.35

Manila, per cwt.

No. 1 Jute Tag, 100-lb., sheets*	$20.55/22.55
Reg. Jute M.F. 40-lb., sheets*	19.50/21.50
Wrapping Manila	8.75/10.50
Printing Manila	10.50/12.00

* Less usual allowance for rolls.

Gummed Tape— per bdl., 500 bdls. or more

90-lb. 375 ft. GSI	$7.20 / —
60-lb. 600 ft. GSI	7.20 / —
35-lb. 800 ft. GSI	8.28 / —
35-lb. 500 ft. GSO	6.21 / —

MARKET WOOD PULP

Third Quarter Contract Prices, Per Short Air-Dry Ton

	Varying freight allowances		On Dock Atlantic Ports		
	*U. S.	Canadian	*Swedish	*Finnish	*Norwegian
Groundwood	$92.50/ —	‡$95.00/100.00			
Sulfate, Bleached	145.00/ —	190.00/200.00	$230.00/ —	$230.00/ —	$230.00/ —
Semi-bleached Sulfate	140.00/ —				
Sulfate, Unbl.	132.50/ —	145.00/175.00	200.00/ —	200.00/ —	
Sulfite, Bldd.	140.00/ —	160.00/175.00	225.00/ —	225.00/ —	225.00/ —
Sulfite, Unbldd.	132.50/ —	150.00/160.00	200.00/ —	200.00/ —	
Sulfite, Unbl'd (Glassine)		164.00/ —			
Soda, Bldd.	140.00/ —	155.00/160.00			
Sulfite Screenings	72.50/ —				
Sulfate Screenings	67.50/ —				
Groundwood Screenings	60.00/ —				
Unbldd Sulfate Sideruns	132.50/ —				
Stand. News. Sideruns	92.50/ —	106.00 —			

* OPS Ceiling, CPR 49 ‡ F.o.b. Shipping Point.

Boards, per ton—

Filled News	$107.50/ —
Plain Chip	165.00/167.50
Bldd. Mix. L-d. Chip	147.50/ —
White Pat. coated .020	170.00/ —
Kraft Liners 42 lb.	115.00/117.50
Kraft Corr. .009	122.50/126.00
Binders Boards	137.50/140.00

The following prices are representative distributors' resale prices.

Rag Content Bonds and Ledgers— White, 20 lb.

Bonds	4 Cnts.
	per cwt.
100% Rag Ex. No. 1	$70.45/$75.90
100% Rag	62.65/ —
75% Rag	48.15/ —
50% Rag	38.90/ —
25% Rag	31.65/ 33.00

Ledgers	4 Cnts.
	per cwt.
100% Rag Ex. No. 1	$72.65/$72.80
100% Rag	63.90/ —
75% Rag	49.40/ —
50% Rag	40.20/ —
25% Rag	33.00/ 34.30

Sulphite Bonds and Ledgers White, 20 lb.

Bonds	4 Cnts.
	per cwt.
Watermarked	$19.00/$20.50
Plain	18.40/ 19.30

Ledgers	4 Cnts.
	per cwt.
Watermarked	$20.50/$21.80
Plain	19.35/ 20.80

White Book

Conversion Coated	Case
	per cwt.
No. 1	$23.90/$24.65
No. 2	22.15/ 23.40
No. 3	21.90/ 22.40
Machine Coated	
No. 1	$18.40/$18.90
No. 2	16.65/ —
Uncoated	
No. 1 Antique (Watermarked)	$19.15/$19.65
Offset	17.40/ 19.90
A Grade K. F.	18.15/ 19.90
A Grade S. C.	16.65/ 19.40
B Grade K. F.	18.40/ —
B Grade S. C.	17.40/ 19.15

‡ Indicates a price change.

WASTE PAPER MARKET

The following quotations were gathered from major dealers in each market. They are an indication of the price range in which volume tonnage was moving on the date specified. Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.)

	New York	Philadelphia	Boston	Chicago
	Sept. 4	Sept. 4	Aug. 31	Sept. 4
No. 1 Mixed Paper	$17.00/ 19.00	$16.00/ 18.00	$17.00/ —	$15.00/ —
Boxboard Cuts	20.00/ 25.00	16.00/ 20.00	23.00/ —	23.00/ —
Mill Wrappers	20.00/ 30.00	20.00/ 22.00	20.00/ —	22.00/ —
No. 1 News	19.00/ 21.00	17.00/ 21.50	— /19.00	18.00/ —
Over-issue News	28.00/ 35.00	23.00/ 26.00	22.00/ 24.00	23.00/ —
Corrugated Containers	37.00/ 39.00	34.00/ 38.00	36.50/ 38.00	30.00/ 40.00
New Corrugated Cuts	Nominal	36.00/ 50.00	45.00/ 55.00	62.00/ —
Double Kraft Ld. Corr. Cuts	90.00/ —	90.00/110.00	100.00/110.00	120.00/ —
100% Kraft Corr. Cuts	120.00/130.00	110.00/140.00	130.00/140.00	140.00/ —
Used Kraft Bags	85.00/ 90.00	65.00/ 80.00	75.00/106.50	60.00/ —
No. 1 Brown Kraft Paper	70.00/ 90.00	70.00/ 85.00	80.00/100.00	60.00/ —
Super Resorted Br. Kraft	90.00/100.00	80.00/100.00	90.00/115.00	90.00/ —
New Br. Kraft Env. Cuts	160.00/180.00	135.00/150.00	150.00/170.00	150.00/ —
New Br. Kraft Cuts	150.00/175.00	120.00/145.00	140.00/170.00	140.00/ —
No. 1 Gdwd Shvs.	65.00/ 70.00	50.00/ 55.00	65.00/ 75.00	45.00/ —
White Newsblanks	90.00/ —	70.00/ —	70.00/ 80.00	70.00/ —
No. 1 Flyleaf Shvs.	75.00/ 80.00	65.00/ 90.00	85.00/100.00	100.00/ —
No. 1 Soft Wht. Shvs.	150.00/170.00	160.00/170.00	165.00/185.00	175.00/ —
Super Soft Wht. Shvs.	190.00/200.00	170.00/175.00	180.00/200.00	185.00/ —
Hd. Wht. Shvs.	185.00/200.00	180.00/200.00	180.00/205.00	180.00/ —
Hd. Wht. Env. Cuts	200.00/245.00	200.00/225.00	190.00/225.00	190.00/ —
New Manila Env. Cuts	140.00/150.00	140.00/165.00	130.00/155.00	100.00/ —
Col. Tab Cards	110.00/120.00	100.00/ —	85.00/140.00	100.00/ —
Manila Tab Cards	170.00/175.00	160.00/190.00	160.00/190.00	165.00/ —
No. 1 Mixed Ledger	95.00/110.00	80.00/100.00	77.00/100.00	100.00/ —
White Ledger	110.00/130.00	105.00/135.00	115.00/130.00	125.00/ —
No. 1 Book & Mag.†	41.00/ 43.00	30.00/ 40.00	30.00/ 50.00	22.00/ —
No. 1 Rep'd. Hvy. Books‡	50.00/ 53.00	43.00/ 50.00	50.00/ 65.00	45.00/ —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% groundwood.

RAG MARKET

New Domestic Cotton Cuttings
OPS Ceiling Price, CPR 28
Delivered Mill Basis

Add 7½% Dealer Commission

No. 1 White Shirts	$21.00
No. 1 Unbldd. Muslins	21.00
Bldd. & Unbldd. Underwears	21.00
Bldd. Canton Flannels	21.00
No. 1 Light Silesias	16.00
No. 1 Light Prints	11.50
No. 1 Blue Overalls	14.50
Suntan Khakis	11.50

Add 10% Dealer Commission

Fancy Shirts	$10.00
Indigo Blues	10.00
Mixed Khakis	8.00
Corduroys	8.00
Cottonades	8.00
No. 1 Washables	6.50

Old Domestic Cotton Rags
(Prices to Dealers, f.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$5.00/$5.50
Cotton Pants & Overalls	4.25/ 5.00
Thirds and Blues, Repacked	4.00/ 4.25
No. 1 Roofing Rags	nominal
No. 2 Roofing Rags	nominal
No. 3 & 4 Roofing Rags	nominal

Bagging
(Prices to Dealers, f.o.b. N. Y.)
PRICES NOMINAL

	Per 100 lbs.
Foreign Gunny	$5.00/$5.50
Domestic Gunny, No. 1	5.00/ 5.50
Heavy Wool Tares	5.50/ 6.00
Foreign Manila Rope	8.50/ 8.75
Domestic Manila Rope	9.00/ 9.25
Jute Strings	6.00/ 6.50
No. 1 Sisal Strings	8.00/ 8.25
Paper Mill Tares	4.25/ 4.50
Foreign Scrap Burlap	4.25/ 4.50
Domestic Scrap Burlap	4.75/ 5.50
Assstr. Wool Pouches	7.50/ 8.50
New Burlap Cuttings	7.00/ 7.50

MATERIALS

Aluminum sulfate:		
comi. bags, wks.	cwt.	1.65
iron-free c.l.		3.25
Alcohol, ethyl:		
tax free, dms. c.l.	gal.	1.01 / 1.05½
dnld. East Miss.		
Alcohol, methyl:		
Synthetic, Zone 1, dms. c.l. fit. alld.	gal.	.44
Casein, acid prec.:		
dom. sh. pt. c.l.	lb.	.38 / .43
imp. ex. dock	lb.	.30 / .41½

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WOODEN CORES

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SACO, MAINE

Jordan Shell and Plug Fillings
TRADE-MARK
POSITIVE
Reg. U. S. Pat. Off.
High Speed Disc Refiner
THE BAHR BROTHERS MFG. CO.
MARION, INDIANA, U.S.A.

PULP PLANT MODERNIZATION
Without Work Stoppage
Ferguson paper mill specialists can expedite a complete modernization program for you—efficiently—economically and without loss of production.
Preliminary Discussions in Confidence and Without Obligation
THE H. K. FERGUSON COMPANY
ENGINEERS AND BUILDERS
Headquarters: Ferguson Building, Cleveland, Ohio
District Offices: New York, Houston, Chicago, Los Angeles, Cincinnati

Caustic soda:		
c.l. wks. solid, 76%, cwt.	3.35	
fak. & grd. 100-lb. drums	3.75	
liquid 50% tanks	2.55	
liquid 70% tanks	2.65	
China clay:		
dom. air-float. filler, c.l. wks. ton	10.00	
water-washed, lump, filler	11.00	
coating	17.60	/30.50
imported, ex whse...short ton	15.20	/26.35
Chlorine:		
single-unit tanks, works. cwt.	2.70	
multi-unit cwt.	3.20	/ 4.40
Formaldehyde:		
USP, inh. dms, c.l. wks. lb.	.0625/	.0675
L.c.l., E. wks.	.0675/	.0725
Fuel oil:		
Bunker C, No. 6 Cal. bvy tanks, refinery bbl.	1.95	/ 2.15
light bbl.	2.00	/ 2.25
Hydrogen peroxide:		
USP, 35% cbys. E. of Miss. lb.	.23½/	.26½
Lime:		
hydrated, bags, wks. ton	13.50	
Rosin:		
B gum, drms, c.l. Savan. cwt.	7.00	/ 9.00*
G, H, I, K cwt.	8.42	/ 9.49*
FF, wood, dn. cwt.	8.50	/ 7.30
* OPS Ceiling, CPR 52.		
Rosin size:		
70%, gum & pale grds, tank cars, mouth, sh. pt. cwt.	7.00	/ 7.10
Salt cake:		
dom. bulk, c.l. wks. ton	17.00	
wks. frt. all. ton	20.00	/22.00
Soda ash:		
light, 58%, bags, wks.	1.50	
bulk cwt.	1.20	
Sodium silicate 40°:		
turbid. c.l. wks. cwt.	1.30	/
L.c.l. wks.	1.60	/ 1.85
Sodium peroxide:		
dms. c.l. E. of Miss. lb.	.21	
L.c.l. dn. lb.	.21½/	.22
Soybean, protein:		
chem. ind, wks. c.l. lb.	.24	/ .28
Cinn. and Chic.		
Sulfuric acid:		
60° Be. cbys. c.l. wks. cwt.	1.75	/ —
L.c.l. wks. cwt.	2.05	/ 2.85
Sulfur:		
crude, c.l. mines, contract, long ton	21.00	/22.00
f.o.b vessels Gulf	22.50	/23.50
Sulfur dioxide:		
liquid, comi. cyl. wks. lb.	.09	
multi-unit cars lb.	.0535	
Starches:		
pearl corn, bags, c.l. wks. cwt.	6.09	/ —
white dextrines, c.l. wks. cwt.	7.48	/ —
potato, Idaho, c.l. wks. cwt.	5.75	/ —
potato, Maine, c.l. wks. cwt.	6.00	/ —
tapioca, conv. dextrines cwt.	8.00	/ 8.75
low, Siam, ex dock N.Y.	5.50	/ 5.75 nominal
Talc:		
domestic, 50-lb. sacks, c.l. wks. ton	25.00	/30.00
Titanium dioxide:		
anastase, c.l. deld., bags lb.	.21	/ .21½
L.c.l. deld. lb.	.22	/ .22½
rutile, c.l. deld. lb.	.23	/ .23½
l.c.l. deld. lb.	.24	/ .24½

SOUTHERN ALKALI CHANGE

The corporate name of Southern Alkali Corp. has been changed to Columbia-Southern Chemical Corp. effective September 1.

Clarence M. Brown, chairman of the board of directors for both Pittsburgh Plate Glass Co. and Columbia-Southern Chemical Corp., stated that the action involves a change in name only. Personnel, policies and customer relations will not be affected.

NEW LITERATURE

American Management Assn., 330 West 42nd Street, New York 18, N.Y. Booklets:

Marketing Series, No. 81, "Essentials of Successful Sales Management." Collates papers presented at AMA conference held in New York, March 1951. Price $1.25.

Production Series, No. 197, "Planning for Peak Production; With a Section on the Impacts of the Wage Freeze." AMA conference papers, New York, March 1951. Price $1.25.

Financial Management Series, No. 97, "Executive Compensation: Company Policies and Practices. With a Paper on The Economic Effects of the Rearmament Program." Conference paper, New York, November 1950. Price $1.25.

Personnel Series, No. 137, "Practical Methods of Management Development." Midwinter Personnel Conference papers, Chicago, February 1951. Price $1.25.

Personnel Series, No. 140, "Tools for Improved Personnel Relations." Midwinter Personnel Conference papers, Chicago, February 1951. Price $1.25.

"Counseling Executives After Merit Rating or Evaluation; A Project in Executive Development," by Earl G. Planty and Carlos E. Efferson." Price 25 cents.

Allegheny Steel Band Co., Box 716, Pittsburgh 30, Pa. Folder, "Allegheny Steelband Tensioners, Sealers and Accessories for Banding all Types of Packages, Bales, Boxes, and Pallets." Technical and sales copy.

American Forest Products Industries, 1319 18th St., N.W., Washington 6, D.C. Booklet, "The Story of Pulp and Paper." Explains development of paper making. Presented as a public service in the interest of forest protection and wise woodland management.

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Bulletin, "The SR-4 in Industry." Briefly describes four ways in which these weighing units are being used.

The Bristol Co., Waterbury 20, Conn. Bulletin No. P1244, "Millivoltmeter Type Indicating Pyrometers and Pyrometer Controllers for Temperatures up to 4000°F." Indicating pyrometers for wall, switchboard, and flush-panel mounting and for portable use are described and illustrated. Gives uses of automatic pyrometer controllers with gas, electric, and oil-fired furnaces. Also, Bulletin, No. Ph1302 "Automatic, Continuous Measurement and Control of PH in Industrial Processes." Describes and illustrates a number of applications of the PH instruments for water treatment, industrial waste disposal, and in the chemical, petroleum, paper, textile, and metals industries.

Centrifix Corp., 3608 Payne Ave., Cleveland, Ohio. Bulletin G-51, "Halt Entrainment Grief With Centrifix, Air, Steam, Vapor, and Gas Purifiers."

The Cleveland Crane & Engineering Co., Wickliffe, Ohio. Broadside, "New Cleveland Tramrail Saf-Powr-Bar."

J. M. Huber Corp., 100 Park Ave., New York 17, N. Y. Brochure, "A Picture Sequence of De-aired Unit Load Clay Shipments as Developed by Huber."

The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. Booklet T-33, "Resistance Welding of Nickel and High-Nickel Alloys." Technical copy. Available gratis.

Magnuson Products Corp., 50 Court St., Brooklyn 2, N. Y. Booklet, "Permag Cleaning Compounds for Paper Mills." Valuable for purchasing and operating personnel. Condensation of hundreds of paper mills experiences in cleaning operations.

National Planning Ass'n., 800 21st St., N. W., Washington 6, D. C. Planning Pamphlets No. 74, "Making Western Europe Defensible." Appraisal of the effectiveness of U. S. policy in Western Europe. Price $1.00.

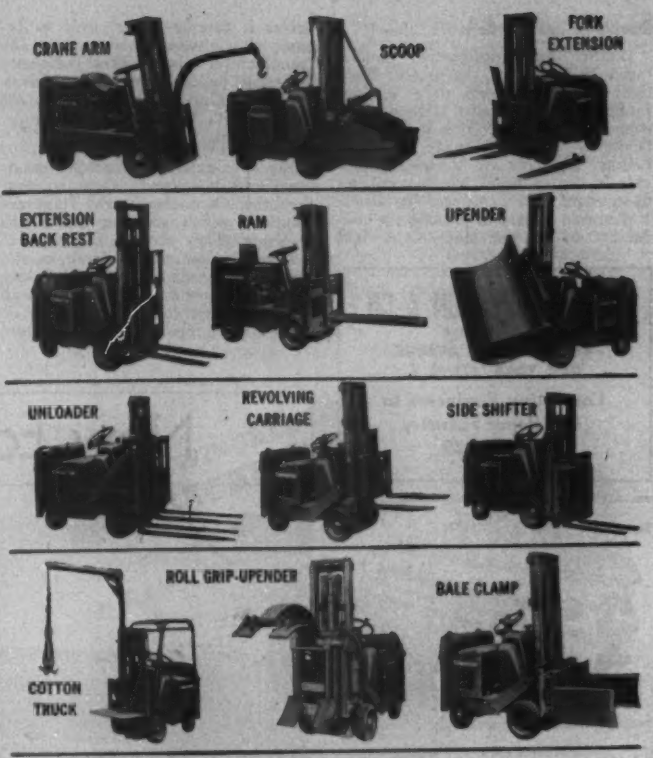
"Pennsylvania Salt Manufacturing Co., 1000 Widener Building, Philadelphia 7, Pa. Bulletin, "Naoh Caustic Soda." Handy reference for particular problems on purchasing, handling and storage, equipment design and technical data.

Revere Copper and Brass Inc., 230 Park Ave., New York 17, N. Y. Booklet, "Paul Revere Pioneer Industrialist." Manner in which he founded the Company bearing his name 150 years ago, together with some description of the historical aspects of its growth.

NEW SUPPLIES

Dynel Filter Cloths

Two new FEON dynel filter fabrics —FEON 166, a twill weave, and FEON 167, a broken chain weave, have been announced. FEON dynel offers the widest range of chemical resistance of any of the FEON synthetics. Dynel is a spun-staple fiber spun from VINYON-N, a copolymer of vinyl chloride and acrylonitrile. This material is said to be virtually unaffected by most concentrated mineral acids, and to have excellent resistance to a wide range of organic acids, bases, and salts. Can be used at temperatures up to 250°F. The spun-staple constructiton gives these fabrics a full-bodied, resilient texture, making them seal easily in press frames with minimum rim pressures. Available immediately, as yard goods or tailored to fit any type of pressure or vacuum filter, centrifuge, or dry filtration equipment. Further information and samples are available from the manufacturer.—Filtration Fabrics Div., Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. J.



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Send to Towmotor Corporation, Div. 17, 1226 E. 152nd St., Cleveland 10, Ohio, for free folders describing the 14 Standard Towmotor Accessories, and Towmotor's Special Engineering devices.

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT AMERICANISM TODAY?

Double V Leather Belts

Leather link construction double-faced V belting is announced. Each link consists of two fibre sections faced with oak tanned leather. Steel connectors are designed to insure great flexibility and eliminate stretch. Leather segments are V-faced to provide a double bevel which conforms to standard V-belt sheaves. The double V featured is said to prolong the useful life of the belt since on straight drives it can be turned over to become the equivalent of a new belt. The manufacturer claims great efficiency on small pulley short center drives.

Source: Graton & Knight Co., 348 Franklin St., Worcester 4, Mass.

Stabilizers For Latex Paints

Six new stabilizers for latex paints have been developed. Two are powders, the others are liquids. These are solutions which stabilize the paint's emulsion. They account for 10 to 25 percent of the paint's total weight. Quick drying and virtually odorless, latex paints can be applied easily with either brush or roller. They leave no brush or lap marks, it is said, even if work is resumed on a partly painted surface several hours later. The tough latex paint film permits removal of grease or other stains without a smudge. This new type of paint will cover practically any type of surface—wood, plaster or wallpaper—without an undercoat. In addition, the paints are easy to make, requiring only simple cold mixing and blending. Advantages of the products include elimination of heating and mixing preparations and storage problems, high water resistance, improved resistance to freezing, more brilliant color, and easier brushing. Write to Chemical Div., Borden Co., 350 Madison Ave., New York 17, N. Y.

ALVIN H. JOHNSON & CO.
INCORPORATED
415 LEXINGTON AVENUE
NEW YORK (17), N. Y.
Consulting Engineers to
The Paper Industry
Since 1929

Since 1937
Gotham Gravure Inks
Gotham Ink & Color Co.
5-19 47th Avenue,
Long Island City 1, N. Y.

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Semi-Chem. and Chemical Pulp Processes
Pilot Plant Facilities
THE KINSLEY CHEMICAL COMPANY
Cleveland 11, Ohio

MISCO
STAINLESS STEEL CASTINGS
FOR ALL EQUIPMENT EXPOSED TO CORROSION BY SULPHITE ACIDS OR OTHER CORROSIVE AGENTS
MICHIGAN STEEL CASTING CO.
DETROIT 7, MICHIGAN

WEIGHING while conveying with the WEIGHTOMETER
Wood Chips, Salt Cake, Sulphur, Coal, Etc.
MERRICK SCALE MFG. CO.
PASSAIC, NEW JERSEY

New Equipment

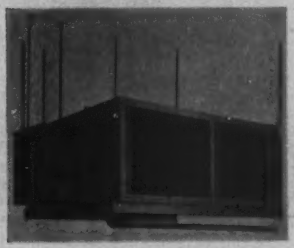
46-inch Copyflex

The new Copyflex machine offers a 46-inch printing width with exposure speeds up to 95" per minute. It is a medium-volume low-cost machine designed for all phases of business and industry.

The Model 20 requires no installation; just a connection to a 60 cycle, 115-volt, a.c. electric line. Fifty and 25-cycle machines also are available. Takes sensitized paper, acetates, films and cloths, safely and conveniently under ordinary factory or office illumination, it is claimed. Dark rooms, developing trays, etc., also are unnecessary, and, since no vapor developer is used, there is no need for exhaust ducts or extra ventilation. Write to Charles Bruning Co., Inc., 100 Reade St., New York 13, N. Y.

Humidifying Unit

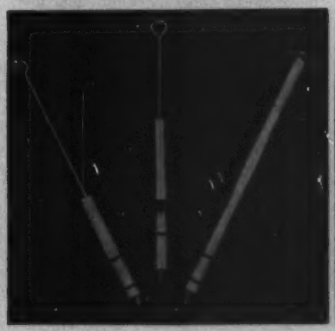
The humidifier is a self-contained unit designed for overhead suspension. Said to be especially well suited for printing and paper trade applications, it delivers moist air, rather than a mist which must be evaporated in the room. This allows use of large grilles which give complete directional control of the delivered moist air. The unit can be located in crowded rooms and will provide good circulation without drafts, it is stated.



The Type BA-2 Unit consists of a rectangular metal housing 62" by 72" by 28" which contains fans, centrifugal evaporators, filters, grilles, and service panel. Control, which is by Automatic Humidistat, is located in an aspirated cabinet that can be installed at a selected point. Accessory equipment available includes pre-filters for extremely dirty atmospheres, heaters, and outside air intakes. Total power requirements are 1½ hp. for up to 12 gallons evaporation per hour. Installation requirements are water supply line, drain, and electrical connection. Address The Bahnson Co., Dept. PT, 1001 So. Marshall St., Winston-Salem, N. C.

Tubular Multilift Magnetools

A complete new line of hand-operated load-releasing tubular Multilift Magnetools is announced. The magnets are used for entering small openings such as blind holes, removing boring chips from castings. Other uses include picking up steel chips and parts from hard-to-get-at-places, around machinery, conveyors and benches, removing chips and metallic sludge from coolant tanks, and boring into tumbling media or carburizing materials to remove parts. Patented brass pickup tip prevents sticking.



Multifinish Mfg. Co., Dept. 479, 2114 Monroe Ave., Detroit 7, Mich.

Plate Applicator

The paste applicator replaces bag-machine bottom paste pots, or paste pots on any machinery where adhesive application is required by rollers. It maintains a constant flow of heavy viscous paste to the applicator roller by a pumping arrangement that is coupled directly to the machine by a gear drive. After an even distribution is made, excess adhesive pumped to the reservoir on the machine is returned to the pump and container for reuse.

Should the machine be shut down for a brief period, an automatic arrangement circulates the adhesive from the pump through the applicator reservoir to prevent paste drying on the roll and to eliminate any paste lumping. Upon resumption of operations the application unit is restored automatically to its original position.

Designated the Weber paste applicator, the unit may be used with modifications on carton and envelope machinery, gluers and labelers. Its principle may be applied to most adhesive pot applications with modifications to fit them, the manufacturer states.

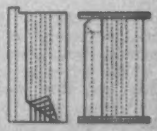
Manufactured by H. G. Weber & Co., Inc., Kiel, Wis.

SMITH & WINCHESTER
BAG MACHINERY
Speeds up Production
and Lowers Costs . . . .

Printed, multi-wall bag made from tubes produced on No. 10 Type Tub-r. May have standard pasted bottom or narrow valve bottom or combination of both as shown.

No. 10 TYPE TUBER
for producing single or multi-wall tubes for pasted bags. TOP VIEW shows traveling web feed with electric eye, side register control. BOTTOMED shows, pasteless pasted or valve bottoms. Tubes tubes up to 30" wide, 60" long.

Built for present day needs to increase production, reduce spoilage and lower unit costs. These machines are custom-made to your requirements and will give continuous, trouble-free service. Increase your profits by speeding up production with Smith & Winchester equipment.



Multi-wall, sewed valve type, gusseted tube made on Smith & Winchester Multi-wall Tuber.

S & W MULTI-WALL TUBER
Up to 100,000 valve notch tubes each 8-hour day may be produced on this Multi-wall Tuber for sewed valve bags. One to 6 walls. Machine built in 2 sizes, 28" and 36" face. Up to 6" gussets. Tubes 20" to 50" long. Improved cross pasting units, photo-electric compensating drives and flying splice paper roll stands can be furnished. If you have a bag problem write us.

THE SMITH & WINCHESTER
Manufacturing Company
South Windham, Conn.

RESTIGOUCHE
BLEACHED SULPHITE
PULP
•
for the manufacture of Cellophane, Rayon and Products of Paper

Restigouche
BLEACHED SULPHITE PULP

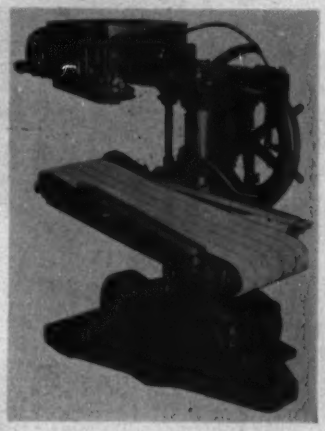
RESTIGOUCHE COMPANY, LTD.
Campbellton, N. B., Canada

Ford Sweeper

Industrial plants, railroads, docks, terminals, etc. will find many applications for the new sweeper which was specially designed for the Ford Tractor. Brush assembly can be removed or attached within a half hour, so that tractor can be used for mowing or other jobs. Hydraulic power raises brush a height of 8" by easy finger-tip action. Brush is driven from rear power take-off. Has large 30" diameter fibre filled broom 6 feet in length, with sturdy full length Dust Hood to reduce dust and protect operator. Sweeps a 5' path. The broom revolves at a constant engine speed ratio providing efficient sweeping at all tractor travel speeds. Brush is set at 30° angle and sweeps all material to right side, clear of tractor treads. Steel brushes also are available. Full information and literature from the Meili-Blumberg Corp., New Holstein, Wis.

Automatic Bag Closer

Quantity production of a completely automatic bag closing machine capable of closing up to 2000 paper bags per hour is announced. Described as the



only fully automatic machine of this type in the world, requiring no attendant, the machine uses a unique arrangement of chain drives to compress neck of bag and then seal it with 12-, 14- or 15-gauge metal wire. It is designed for low-cost mass production packaging of bags weighing from two to 100 pounds when filled, and can be added to existing facilities or adapted to a wide variety of individually-engineered conveyor installations, it is stated. Now in production at Hamer Machine Co., 6417 Cambridge St., St. Louis Park, Minneopolis, Minn.

3-in-1 Mixer

A new heavy duty A.S.M.E. mixer for processing and blending viscous compounds, such as plastic compounds, heavy chemical solutions, solids suspended in heavy liquid vehicle, and the like, is announced.

Rotation of the turbine, because of the pitch of its blades, gives the material a combined peripheral and upward motion. As some of the material strikes the baffles, it is turned back to give it an extra rotary kneading or turn-over action. At the same time some of the material flows between the baffle and the cylinder wall which gives it a shearing effect. Thus, the entire mass goes through a continuous suction, dispersion, kneading and shearing cycle which rapidly disintegrates and distributes uniformly and intimately any solids in the vehicle or homogeneously mixes fluids of dissimilar specific gravity and viscosity, the manufacturer states.

The 36" diameter mixer is welded in accordance with Paragraph U-69, A.S.M.E. Code, for vacuum operation. A full steam jacket is provided for heating the product during the mixing process. The cover which is gasketed and bolted to the tank is provided with an 11" x 15" hinged manhole and a 4" sightglass. Outlet valve is located on the bottom of the tank. A thermowell projects into the side of the tank near the bottom. An 18" diameter turbine type impeller is driven at approximately 125 r.p.m., by a 2 hp. explosion-proof motor through a speed reducer. To augment the impeller, three baffles have been equally spaced in the tank, projecting radially along the cylinder but mounted one inch away from the cylinder wall. Further details from L. O. Koven & Brother, Inc., Jersey City, N. J.

Vapo Conditioning Systems

Properly controlled moisturizing of papers can be obtained by installing Vapo Systems right ahead of calender stacks or at the reel. When used between the Yankee machine and the calender stacks, the system increases the moisture content of the paper without crushing, calender blackening, or blistering. This is accomplished by the use of accurately calibrated spray nozzles spaced across the moving sheet or web. The spray nozzles are indi-

vidually adjusted, and once set are automatically controlled. Any degree of moisturization can be secured over and across any section of the moving sheet or web, the manufacturer claims. Positive and uniform control is through two push buttons. Controls are all located on one panel and include positive filters.

Vapo Systems also are used in treating and finishing with chemicals and other additives. Write to Vapo Systems, 1931 S. Tenth Ave., Maywood, Ill.

Flammability Tester

The SPI Flammability Tester was developed by the Society of the Plastics Industry to measure the relative flammability hazard of various sheet materials from 0.001 to 0.250 inches thick (or more) including plastics, textile fabrics, rubber, paper, etc., varying from very flammable to extremely flame-resistant. The objective was to provide all pertinent data accurately and reproducibly, and as automatically and as simply as possible.

The sample is easily mounted by laying it in the specimen holder outside the cabinet and snapping the spring tension jaw shut. Combustible samples are tested by sliding the specimen holder with sample into the cabinet. When the sample reaches test position, it contacts an igniting flame and simultaneously starts a timing clock. With the first burst of flame from a small vertical segment of the sample, a cotton thread is burned stopping the ignition clock. Simultaneously a second clock starts and continues to run until the traveling flame burns another thread; thus, measuring ignition and burning rates automatically. A thermocouple mounted in the flame registers the intensity of heat on a pyrometer during the same operation. Ease of extinguishment can be judged on the same sample.

Greater degrees of severity can be applied to flame-resistant materials. Highly flame-retarded samples, which will not continue to support combustion by themselves, are tested in vertical position by operating the clocks manually. Produced by Custom Scientific Instruments, Inc., 541-543 Devon St., Arlington, N. J.

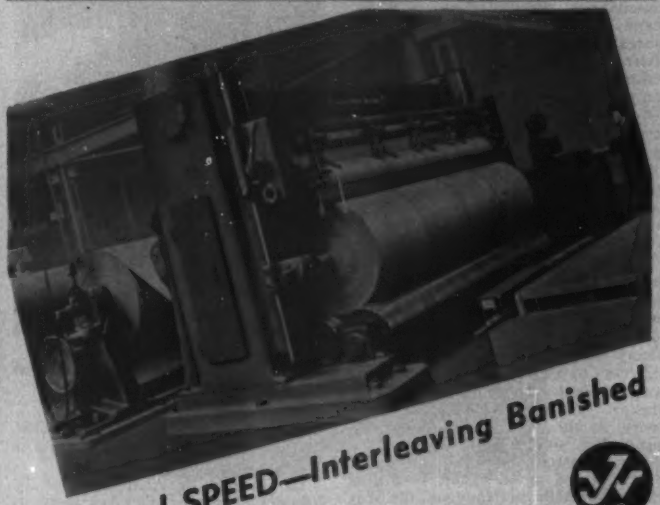
Steel Strap Cutter

Designed to answer the need for a lightweight tool to cut all sizes of steelstrap quickly and conveniently is the new E14AO Strap Cutter. Weighing just one pound and measuring 9½" long, the tool is designed for receivers of strapped packages. Even Unit-Load Band up to ¾" x .035" can be cut with this tool, it is said.

A flat lower blade permits easy insertion beneath tensioned straps without digging into package or bale. To prevent straps from turning on edge or wedging between blades, a band-guide was built into the cutter. Write to Acme Steel Co., Dept. US-61, 2838 Archer Ave., Chicago 8, Ill., or local service offices.

FIGHTING PAPER WANTED

Invitation to Bid has been issued by the New York Quartermaster Procurement Agency, 111 East 16th street, New York 3, N. Y., on QM-30-280-52-174, covering Paper, Wrapping, Waxed, Self Sealing, White, Roll Form, 25 lb. Waxed to 38 lb. Bread Wrapping Machine, 16" and 18", 23,531 rolls. Bids will be opened September 27, 1951, at 10:00 A.M. (EDST) at the New York Office. This procurement is for the U. S. Army.



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NEW ENGLAND AND MIDDLE ATLANTIC STATES
William J. Dorsey, Room 423-E, 30 Church St., New York 7
SOUTHERN AND PACIFIC COAST STATES
American Paper and Pulp Co., Inc., 300 Fourth Ave., New York 10

Aljian, Atchison and Lathrop team with Hawaiian Sugar Industry to Study Utilization of Bagasse

A large-scale project is now getting underway in Hawaii which will involve a comprehensive study of the possibilities of utilization of sugar cane bagasse. This project is sponsored by the Hawaiian Sugar Planters' Assn. and other interests in their efforts to strengthen Hawaii's economy with new industries. All-out effort will be made to develop the fullest commercial use of bagasse for pulp, paper, feed and other products.

A top flight group of experts from the pulp and paper industry has joined with the sugar industry experts on this project which may well link the two industries together in the Islands.

It has been announced that the overall coordinator of this important project will be George W. Aljian, director of Purchasing and Packaging, California and Hawaiian Sugar Refinery Corp. Mr. Aljian has had some 32 years of experience in the technical and economic phases of the sugar industry. In addition, his extensive work in the field of packaging has made him well known to the U. S. paper industry. During World War II he served as an expert packaging consultant with the Navy and the War Production Board. This unusual combination of talents and experience peculiarly fits him for the task of coordinating technical and economic phases of the project and blending together research activities of the sugar industry with those of the pulp and paper industry.

In addition to his many other business and professional activities, Mr. Aljian served as president of the National Assn. of Purchasing Agents in 1946.

Left to Right—Joseph E. Atchison, George W. Aljian, Leonard D. Baver.

Dr. Joseph E. Atchison and Dr. Elbert C. Lathrop, other key members of this team, are both well known in the pulp and paper industry and both have done extensive work in the field of utilization of agricultural residues.

Dr. Lathrop has had wide experience both in the Government service and in industry. His industrial experience includes work with E. I. du Pont de Nemours Co. as a division manager in the chemical department; as vice-president of S. P. Stadler and Son, Inc., consulting chemical engineers, Philadelphia; as director of research and later vice-president of the Celotex Corp.; and as technical director of the Crown Zellerbach Corp. Since the Regional Laboratories were established by the Department of Agriculture, Dr. Lathrop has directed the research work on industrial utilization of agricultural residues at the Northern Regional Laboratory at Peoria, Ill.

For many years Dr. Lathrop has specialized on the use of plant fibers such as bagasse in the production of cellulose pulps, papers, boards and building material. Because of the vast experience which he has in this field, a considerable portion of the basic experimental work on this project will be centered at the Northern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture, Peoria, Ill., under the direction of Dr. Lathrop and his assistant, Dr. Samuel Aronovsky. Representatives of the Hawaiian Sugar Planters' Assn. are expected to work with the Peoria staff during the next year. This group will make a concentrated effort to solve some of the technical problems connected with better commercial utilization of bagasse.

Dr. Atchison is participating in this project while on a short leave of absence from his position as Chief of the Pulp and Paper Branch of ECA. He is now in Hawaii assisting Mr. Aljian and the sugar industry in preparation of a master plan for the comprehen-

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Log Barkers	Digester Heaters—Pumps	Automatic Dump Valves
Bark Presses	Blowsteam Condenser Plants	Chip Packers
Knotters	Turpentine Condensers	Chemical Feeders

sive study to be made over the next few years on the possibilities of better commercial utilization of bagasse.

Dr. Atchison was asked to participate in this phase of the work because of his extensive experience in the pulp and paper industry, including specific work on production of pulp from bagasse. He first became acquainted with the sugar industry while studying chemical engineering at Louisiana State University and working in the University sugar factory. Later, while a student at the Institute of Paper Chemistry, he worked with Sidney D. Wells for one year on the utilization of bagasse for production of pulp and other products. His experience in the pulp and paper industry includes work with the International Paper Co., the Gardner Board and Carton Co., the Pulp Division of Weyerhaeuser Timber Co., and as technical director of the John Strange Paper Co.

During World War II, as an officer in the U. S. Army, Atchison spent more than three years in Hawaii and other Pacific islands, so he is no stranger to this part of the world.

As a result of his work in the Marshall Plan countries during the past three years, he has gained broad experience in the commercial production and utilization of straw pulp for paper and paperboard. Problems involved in production and utilization of pulp from straw are very similar to those in use of cane fiber. He has gained an extensive knowledge of new developments in production of pulp and paper in countries all over the world, and is familiar with world markets in the pulp and paper field. He has gained a world-wide reputation in the paper industry as a result of his many publications, especially in the field of utilization of agricultural residues for manufacture of pulp and paper.

The prime movers of this entire program to develop by-products from bagasse have been Dr. Leonard D. Baver, Director of the HSPA Experiment Station, and Frederick Simpich, Jr., secretary of Castle & Cooke, Ltd., and chairman of the By-Products Committee of HSPA. These men have both worked energetically during the past months to get the project set up and in position to go forward.

The team of Aljian, Atchison and Baver is now hard at work on the master plan to be followed in the investigations. Fulfillment of this plan may, however, require years of intensive effort, although some phases may be dropped from time to time because of established economic or technical obstacles under present day conditions.

As a result of this preliminary study of the problems involved and as work progresses on specific phases of the project, the services of other available experts in this field will be utilized. It may also be desirable to utilize the facilities of other research laboratories, semi-commercial and commercial plants as the work progresses.

Several separate and distinct phases of activities seem imminent in this study. In general, the Hawaiian Sugar Planters' Assn. outlines these as follows:

1. Developing the most efficient method of separation of pith from fiber so that each fraction can be recovered in suitable condition for commercial utilization. No large scale commercial process has yet been put in operation which satisfies these requirements, yet the future development of the entire project depends upon successful separation of pith and fiber. A small scale pilot plant for separation of pith and fiber is now in operation at the Peoria laboratory and a large scale semi-commercial unit is in operation at Oahu Sugar Co. in Hawaii. Although the results thus far have been promising, a tremendous amount of work remains to be done on this problem before a successful commercial operation can be assured. Work on this phase will be intensified during the next year.

2. Developing suitable uses for the pith fraction. At the present time the most promising use appears to be in the field of livestock feed for which

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Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

there is a ready market in the Islands. Intensive work will be done toward determining the most suitable mixture of pith, molasses, protein and other ingredients necessary for livestock feed. Work in Hawaii involves close collaboration with the University of Hawaii and with local ranchers.

3. Determining the suitability of the fiber for utilization in the pulp and paper industry. This is a broad field and has many possibilities, all of which will be included in the study. It will certainly involve a technical and economic study to determine the possibility of establishing a fiber, pulp and/or paper industry in Hawaii. Possible products may include pith-free fiber, corrugating medium, test liner board, mulch paper, building paper, chipboard, bleached pulp, bleached paper and paperboard, etc.

4. Determining the possibilities of manufacturing chemicals from molasses and bagasse, and possibilities of manufacturing in the Islands those chemicals required in pulp and paper manufacture.

All of the possibilities enumerated above involve so many problems that the team at work drafting the overall plan makes it very clear that only the distant future will reveal satisfactory solutions in this work.

J. O. Ross Engineering Corp.

Installations

Columbia Cellulose Co., Prince Rupert, B. C.

Trim Conveying Systems

Two Trim Conveying Systems—one selected for use with Sandy Hill slitter-rewinder, operating at 600′ per minute; the other was to handle a pulp sheet trim from a Lamb Gray Harbor Company machine, operating at 350′ per minute. The trim was conveyed to a Apnew Repulper. This System had Monogram Design 3 blowers, was completely designed and manufactured in this country, and shipped to British Columbia.

Chesapeake Corp., West Point, Va.

Washer Hood and Exhaust

A complete Hood and Exhaust for #1 Thickener, and an exhaust unit only for #2 Thickener, utilizing an existing new hood. Both Thickeners were 6′ x 11′ Valley Iron Works units, and handled 300 tons of air dried pulp per day, stack temperature being about 190°F. B. F. Sturetevant Axiflo fans were provided for exhaust, and the

Ross-Brinar economizer with water heating equipment for Ross pulp dryer at Chesapeake Corp. of Va., West Point, Va.

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SANDUSKY FOUNDRY AND MACHINE CO.

Ross pulp dryer at Chesapeake Corp. of Va., West Pt., Va., showing fresh air connection from Ross-Briner economizer and recirculating fans which furnish heated air to the pulp sheet.

hood was made up of Ross standard asbestos board panels.

Exhaust Unit

Also provided is a Wing Scruplex fan for exhausting from the wet end of the Pulp Dryer Room.

Ross Pulp Dryer

The Ross Pulp Dryer at Chesapeake was the first commercial unit of this type installed.

The dryer handles a sheet 120" wide in 9 passes, and is 125' long. The dryer is currently consistently drying in excess of 160 tons of pulp per day. The Ross Dryer relies exclusively on the use of heated air, and the necessary BTU.'s are applied by convection only. The air preheaters and recirculation elements are located in the side of the dryer housings for ease of maintenance and repair. The conveyors require no lubrication, thereby preventing spoilage, permitting maximum brightness of the pulp and reducing the fire hazard to a minimum.

The dryer housing consists of galvanized Ross tongue and groove panels with 3" of insulation. Special fans were provided, of the Axiflo multibladed type. Each pass of the conveyor has its own variable speed drive, permitting adjustment of pulp tension to take care of slippage and shrinkage as the sheet progresses through the dryer.

Ross-Briner Economizer is installed to heat incoming makeup air, and equipment is available for water heating if desired. Access doors and walkways are provided for ease of operation, and electric elevators at each end, with cooling outlets for the comfort of men make for simple threading.

Since this first installation, as you know, there has been an installation at St. Marys Kraft, St. Marys, Georgia, and we are currently installing a similar unit at Riegel-Carolina, Acme, North Carolina.

Makeup Air Units

In the Paper Mill is installed three Air Makeup units to bring the air requirements in balance for the current production of 420 tons per day. This consists of huge Axiflo fans, distributing tempered air into various sections of the mill.

Felt System for Dry End of Paper Machine

Supplementing the existing wet and felt supply, there is provided an additional unit for the dry end of this machine, and revamped the wet end unit relocating some of the nozzles, so that the Felt System for this machine would be in line with current production and speeds. The supply fan is of the B. F. Sturtevant Silentvane Design 10 type, and nozzles are arranged to supply 50 percent of the air to the center one-third of the dryer felt.

West Virginia Pulp and Paper Co., Covington, Va.

Since 1949, the followni have been installed:

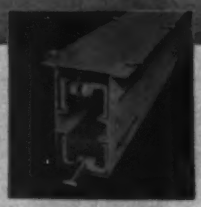
#6 Machine, and #6 and #7 Machine Room Air System

When the #6 Machine was revamped, the Air Systems for the Machine and Machine Room were re-

Redlers

PICK UP the CHIPS

Store and Carry Them to the Digestors



Chip handling is only one of the many jobs S-A Redler Conveyor-Elevators handle in a speedy trouble-free operation—fully protected from weather and spillage. They are compact and, as illustrated by this installation, can be fitted readily into existing plant layouts.

S-A engineers have developed a great variety of bulk materials handling equipment with which they can design unusually efficient systems. If you have an operation where handling costs are high or delays and trouble occur, see what S-A engineers can suggest. Write us.

GREEN BAY PULP & PAPER CO. GREEN BAY, WIS.

From wood-room at right in picture, a horizontal run of one Redler Conveyor picks up wood chips and elevates them 52 feet, then bends to another horizontal run discharging into two storage bins. S-A Bin Discharge Unit, with revolving arch breaker to keep chips flowing freely, reclaims and feeds to the horizontal run of another Redler beneath bins. Same conveyor inclines upward 58 feet to top of building at left. Here it levels off and conveys horizontally over digesters to which it discharges. Low cost handling is achieved at 39 to 47 tons per hour.

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AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

	July 28	Aug. 4	Aug. 11	Aug. 18	Aug. 25
1951	99.5	100.3	99.3	98.1r	101.7*
	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26
1950	99.9	99.4	98.5	100.0	100.6

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	92.6	93.6	96.7	93.4	96.4	97.7	83.3	99.6	96.1	101.0	99.6	91.2	95.8
1951	99.3	101.3	101.9	102.8	102.5‡	100.2‡	89.4‡						

‡ Preliminary.
r Revised.
* Weekly capacity base increased by 495 tons.

COMPARATIVE YEARLY SUMMARIES

	1944	1945	1946	1947	1948	1949	1950	1951
Year to Date	87.9	87.8	99.9	102.7	97.5	85.5	95.0	99.9
Year Average	88.1	89.4	101.1	104.3	96.2	88.6	95.8	

PAPERBOARD OPERATING RATIOS†

	July 28	Aug. 4	Aug. 11	Aug. 18	Aug. 25
1951	97	94	94	93	94
	July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26
1950	96	98	99	101	100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	88	92	91	92	91	94	82	100	96	102	101	95	94
1951	102	105	104	103	104	103	84						

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "inch-hours" reported to the National Paperboard Association.

newed, or revamped. Provided were:

(1) A curtain along the front of an existing hood and a new exhaust system having four fans;
(2) Two Bottom Felt supply units;
(3) Two Air Makeup units;
(4) Air filters and heaters for Heating and Ventilating #6 and #7 Machine Room.

Washer Hood and Exhaust Systems

For the three lines of Impco 11½′ by 16′ Washers. In the new Consolidated Pulp Mill at Covington, we provided standard Ross asbestos panel hoods, attached to angle iron frames by means of countersunk stainless steel bolts, for lines A, B and C. These hoods had eight Axiflo exhaust fans located in penthouses on the roof. Particular care was given to providing minimum interference at ladders for walkways, and in suspending the hood to eliminate any vibration from the deknotter section.

Additions to #5 Machine Air Systems

#5 Machine was completely revamped, and the Air System was almost entirely renewed. One existing dry end felt supply apparatus was used, and the heating and ventilating apparatus. The distributing duct work in both cases was renewed, and filters and heaters replaced were needed.

The new equipment consisted of:

(1) Hood and Exhaust System;
(2) Heating and Ventilating duct work throughout the Machine Room and Beater Room, section over the wet sections;
(3) Bottom Felt Supply System for the wet end of the machine, as well as new heaters and filters and distributing duct work for the Dry End Felt Supply System;
(4) Two Air Makeup Air Unit Systems;
(5) Ross-Grewin System, having two sets of apparatus, with nozzles in the pockets of the machine and of the return felts;
(6) Trim Conveying System for winder. This System handles up to 4″ wide trim, at speeds up to 3000′ per minute, and delivers it from the #5 Machine winder to the broke beater about 100′ away.

Stainless steel heaters were used throughout.

Dollinger automatic air filters were utilized on Supply Systems.

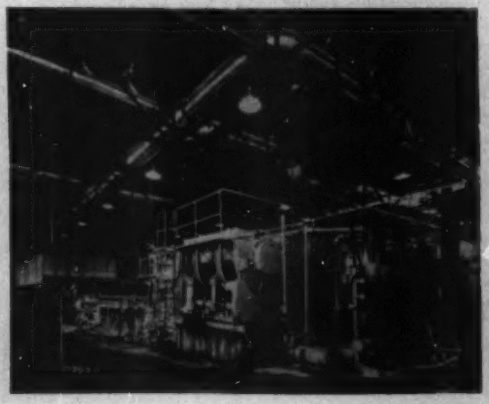
Bleach Washer Hood

This hood was designed to cover the overflow shower at the top of the washer and the 55″ wide flow box. The hood was made completely removable so that it could be rested on the inlet box and be taken away by the Washer Room crane. The exhaust was through a stack up to the roof where the exhaust fan was located in the penthouse. The IMPCO Washer was 8′ diameter by 10′ long.

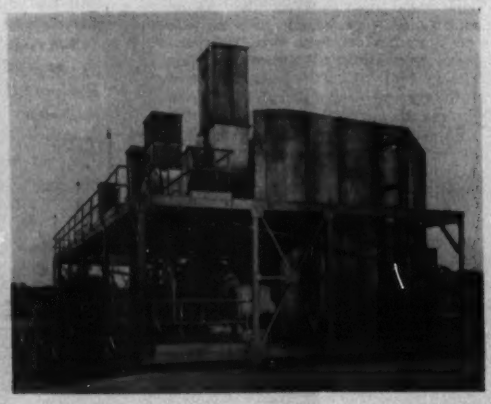
Hood and Exhaust Systems for the Fumes from the Seal Box for the Barometric Legs of the Washers

Asbestos board hoods were utilized and tightly enclosed the seal box, except for about 6″ clear, to permit overflow and air inlet. Centrifugal

Aluminum heating and ventilating ductwork and panel hood at Finch-Pruyn, Glens Falls, N. Y.



Ross-Briner economizers on roof of Finch Pruyn Co., sections are of aluminum to permit installation on roof without reinforcing.



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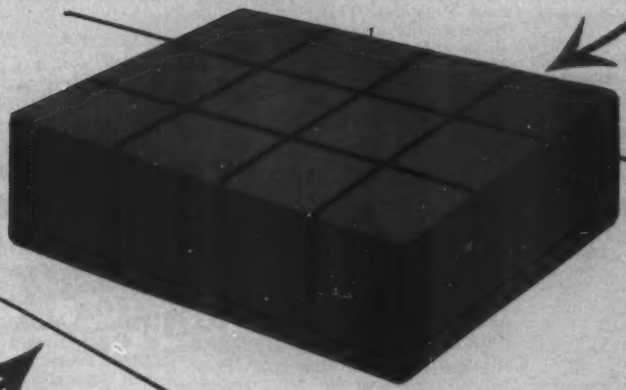

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10 East 40th Street, New York 16, N.Y.

fans were located on top of the seal box, and the exhaust was through outlets extending through the wall of #3 Bleach Room.

Hood and Exhaust System for Weco Filter

This filter was located in the basement. The hood was suspended from the roof structure, and the Axiflo exhaust fan expelled the air out through the side wall of the building. Filter was to handle 1200 gallons per minute of black liquor at 180°F.

Air Systems #7 Machine

There were three parts to the additions for the Air Systems of #7 Machine:

(1) Exhaust units located in an existing collection area behind the hood of #7 Machine;
(2) Revamping and replacing all of the dry end Felt System duct work;
(3) New wet end Felt Supply System. Dryers were added on the wet end of this machine, and the dryer section, especially the travel of the dryer felt was completely changed.

#8 Machine Air System

#8 Machine of course, is not installed as yet, but we have on order an Air System, consisting of seven parts:

(1) Wet End Ventilation;
(2) Hood and Exhaust;
(3) Two Heating and Ventilating Units;
(4) Two Bottom Felt Supply Units;
(5) Three Air Makeup Units;
(6) Calender Cooling;
(7) Ross-Grewin System.

Stainless steel heaters are used throughout: Silentvane Design 10 fans, and Axiflo fans, except for the Grewin System, which, of course, uses centrifugal compressors.

Ross-Grewin System for #6 Machine

This System for the 170" face Machine is designed with the latest engineering features and apparatus models.

West Virginia Pulp and Paper Co., Charleston, S. C.

Hood and Exhaust for Brown Stock Washers

This System was similar to the installation at Covington, again having three lines of Washers—lines A, B and C, with 11½' x 16' washers, and provision for deknotters in the future. Each line handles 450 tons of stock per day, and the hoods were constructed of asbestos panel construction with stainless steel bolts, and each had two Axiflo exhaust fans located on the roof in penthouses, of asbestos panel construction.

Ross Constant Temperature Humidity System

This Air Conditioning System was designed for room approximately 9' x 14' x 9', and was designed to maintain conditions at 70°F., and 50 percent relative humidity. A complete package Ross Air Conditioner was used, utilizing a York compressor.

Brunswick Pulp and Paper Co., Brunswick, Ga.

Cooling Unit for Flakt Dryer

It has been found that the Flakt Dryer delivers the sheet to the cutter for bundling at too high a temperature, to maintain maximum brightness. We installed a cooling pass above the dryer for cooling the sheet down sufficiently to maintain maximum brightness. This consists of an enclosure 122' long for the 156" wide sheet, with supply units, and a system of duct work to deliver the air so that it impinges against the sheet as it is being carried through the cooling section on an oilless type conveyor.

Fans for Flakt Dryer Room

It is unbearably hot in the Summer, and supply and exhaust are needed for the Flakt Dryer Room. We are providing five Axiflo fans, which will be used for supply and exhaust to help relieve this condition.

Finch, Pruyn & Co., Inc., Glens Falls, N. Y.

Air Systems for #1 Machine

The hood consisted of Ross standard panels with wide overhang and deep curtains, covering the dryer section and exhaust outlets up to existing exhaust units. These existing fans were later replaced with new Silentvane Design 10 fans, and aluminum Economizers were installed for fresh water heating, and the air heated by these Economizers was returned to the Machine Room through two new Makeup Air units and a Bottom Felt Supply System. We also provided completely new Ross-Grewin System for this new Pusey & Jones machine.

Hood for #2 Machine with Economizers

#2 Machine was equipped with a new hood, similar to #1 Machine, and included the replacement of Economizers made of aluminum construction for lightness, so that they could be located up on the roof.

Air Systems for #3 Machine

#3 Machine was completely revamped, and the Ross equipment consisted of a Hood and Exhaust, with complete set of aluminum lightweight Economizers arranged for fresh water heating, and a Bottom Felt Supply System, and Machine Room Heating and Ventilating System, utilizing the heated air from the Economizers. Also supplied were new parts for revamping the existing Grewin System on #3 Machine.

FINANCIAL

Union Bag & Paper Corp. has declared a regular quarterly dividend of 50 cents per share and an extra dividend of 50 cents on the capital stock, both payable September 14, 1951 to stockholders of record September 7, 1951.

Fraser Companies Ltd., has declared a dividend of 50c and extra $1 on common stock, payable October 22 to stockholders of record September 29, and another dividend of $1.18 on preferred stock, payable October 1 to stockholders of record September 10.

Anglo-Canadian Pulp & Paper Mills Ltd. has declared a dividend of 45c, payable October 2 to stockholders of record September 15.

Great Lakes Paper Co., Ltd., has declared a dividend of 25c on new common stock and another of 62½c on preferred, both payable September 29 to stockholders of record September 10.

Marathon Corp. and its subsidiaries in the nine months ended July 31, 1951, earned $6,334,245, after provision of $11,914,361 for income taxes. These earnings represent a 41.5 percent increase over the comparable period the year before when net income totaled $4,476,592 after taxes of $3,029,774.

After preferred stock dividend requirements, the latest nine-month earnings were equal to $4.74 a share on the company's common stock, compared with $3.31 a share in the corresponding nine months of the preceding fiscal year.

Net sales in the period totaled $68,074,032, as against $47,923,786 the year before, an increase of 42 percent.

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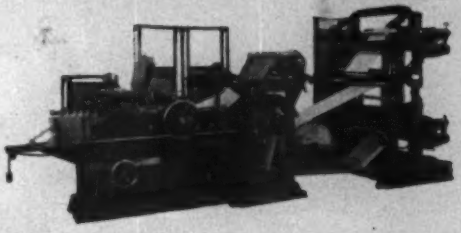

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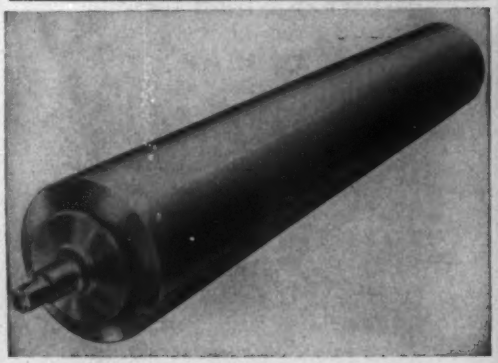

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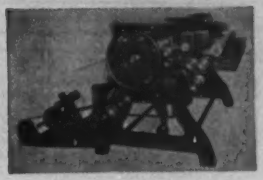

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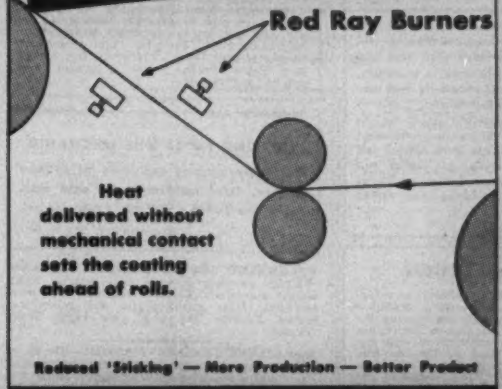

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8-7

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This advertisement placed by consulting firm who will screen applicants. Responses will be handled confidentially. Box 251-463, care of Paper Trade Journal. 8-7

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Must be mechanically inclined for cylinder paper machine. Write giving full particulars of background and salary expected. Box 51-431 c/o Paper Trade Journal. 8-7

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70" Cameron type S model 10 Slitter.
72" Moore & White Rewinding Reel.
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42" Moore & White Sheeter with Layboy.
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1—123" 3 bowl revolving reel.

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72—Top and bottom *Dryer* Bearings 7" diameter x 12" long.

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Beater roll 14" diameter x 10½" face.
1—Noble & Wood Cast Iron Beater—1000# capacity—roll newly refilled.

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1—9 roll 68" Calender Stack.
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1—72" 4 roll calender stack. (Extra heavy duty).
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1—Cast Iron Stock Chest, 25' long x 8' high. (With agitator).

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1—96" Murray 4 knife Chipper—anti-friction bearings.

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1—Murray Chip Crusher.
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2—30" diameter x 72" face.
1—38" diameter x 79" face.
1—34" diameter x 54" face.
1—36" diameter x 86" face.
1—48" diameter x 72" face.
3—36" diameter x 78" face.
1—30" diameter x 93" face.
1—36" diameter x 72" face.

DRIVES
1—#6½ Reeves Drive.
1—#4 Reeves Drive
1—Reliance Electric Drive, complete with 8 gear head motors.
1—#3 Reeves Drive (totally enclosed).

DRYERS
1—Complete unit, consisting of 6 dryers, 36" diameter x 98" face, including frames, gears, anti-friction bearings.
7—24" diameter x 49" face.
1—36" diameter x 143" face.
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1—24" diameter x 93½" face.
2—38" diameter x 48" face.
1—64" diameter x 48" face.
1—60" diameter x 68" face.
1—36" diameter x 66" face.
1—20" diameter x 61" face, complete with frames.
8—24" diameter x 62" face.

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1—60" Cutter.

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1—6 plate Sharrie Flat Screen
3—Packer, 12 plate, roller shoe type.

JORDANS
1—Herne Jordan.
2—Noble & Wood Mammoth.

LIME SLUDGE FILTERS
3—IMPCO Lime Sludge Filters, vacuum type, 5' diameter x 4' face.

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Write us regarding your requirements.

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3—Sets Primary Presses, complete 145" face. Anti-friction bearings. Also all types of rolls for 145" wet end.

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Various cone and assorted pulleys.

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1—Jones Pulper. Complete with motor and drive.
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Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.
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REEL
1—123"—3 bowl Revolving Reel.

REFINERS
3—#1 Claflin Refiners.

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Felt, Table, Press, Breast, Couch, etc. Various sizes and types. (Bronze, Rubber, Iron, etc.)

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1—#2 Bird Rotary Screen.
1—#2A Bird Rotary Screen.

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1—#5 Bird Saveall.
2—Savealls, 36" diameter x 136" face cylinder molds, iron and vats.

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1—65" Clark Sheeter, 8 roll backstand.

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2—Daniels Rag Cutters.

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1—118" 2 drum Waldron
2—112" Cameron—Type 18.
1—104" Beloit two drum winder.
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1—10 x 20 Sharrie Duplex.
1—7 x 16 Sharrie Duplex.
Advise us to your requirements.

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1—Sandusky Couch Roll 120" drilled face x 12" diameter.

SUCTION BOXES
2—136" face Suction Boxes.

THICKENER
1—IMPCO Thickener—Cylinder mold 36 x 78.

VACUUM PUMPS
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[illegible]	G.E.	S.C.	440	I.M
[illegible]	G.E.	S.C.	880	I.M
[illegible]	G.E.	S.C.	880	I.M
[illegible]	West.	Syn.	277	
[illegible]	West.	Syn.	327	
[illegible]	West.	S.C.	880	I.M
[illegible]	Al.Ch.	S.C.	720	ANX
[illegible]	West.	Syn.	900	
[illegible]	West.	Syn.	900	
[illegible]	West.	S.C.	1750	IK
[illegible]	West.	S.C.	1750	CS
[illegible]	West.	S.C.	1750	CS
[illegible]	G.E.	S.C.	1750	CS
[illegible]	G.E.	S.L.	3575	ITC
[illegible]	West.	S.C.	1750	CS
[illegible]	West.	S.R.	575	CW
[illegible]	G.E.	S.C.	1750	KT
[illegible]	G.E.	S.C.	1750	KT
Wst. G.E.		S.C.	1150	KTKM
500 v. West.		S.C.	1750	CS250
Cr.Wh.		S.C.	1750	
West.		S.C.	1750	CS
Al. Ch. (new)		S.C. (Hi-Tors)	1200	ARWNH
West.		S.C.	1750	CS

HP	Make	Wdg	Spd.	Type
10	West.	S.C.	575	CSX50C
10(3)	Al.Ch.	S.L.	575	ARY
10(3)	West.	S.C.	1750	CSX50C
15	West.	S.C.	1750	ARY
7½(3)	Al.Ch.	S.L.	575	ARY
7½	G.E.	S.C.	1760	KT
7½	West.	S.C.	1760	CS254Y
7½	West.	S.C.	1760	CS
5	West.	S.C.	1760	CS
5/1½	L.A.	S.C.	900/1800	2HP
5	Master	S.C.	1150/20	PA
5	Burke	S.C.	450	5HP
5	Wst.	S.C.	1760	
3	550v.Wst.	S.C.	1760	CS254

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[illegible]	Wst.	2300	230/460
[illegible]	Al.Ch.	2300	230
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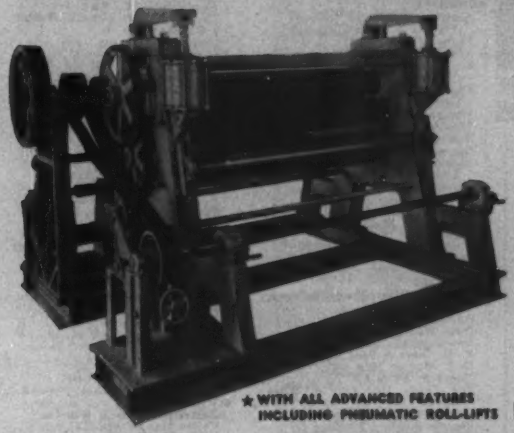

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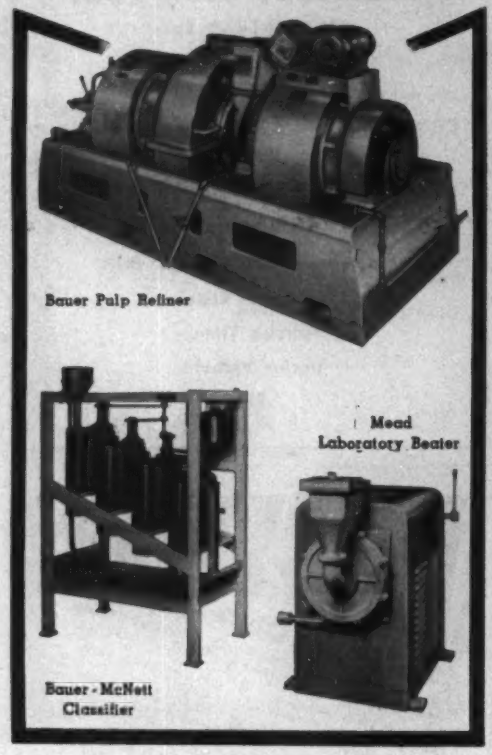

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Diamond Alkali Co.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuffs Corp.
Geigy Co., Inc.
B. F. Goodrich Chemical Co.
Gottesman & Co.
Hercules Powder Co.
Hooker Electrochemical Co.
The Kinsley Chemical Company
Monsanto Chemical Company
National Aluminate Corp.
Naugatuck Chemical Division of U. S. Rubber Co.
Niagara Alkali Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Virginia Smelting Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

CHESTS
The Bagley & Sewall Company
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
Shartle Bros. Mch. Co.

CHIP PACKERS
Fibre Making Processes, Inc.

CLEANING MATERIALS
American Cyanamid Company Industrial Chemicals Division
Diamond Alkali Co.
The Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co.
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
The Bagley & Sewall Company
Black Clawson Company
Farrel-Birmingham Co.
Hudson-Sharp Mch. Co.
Mauro & Weiss Inc.
D. J. Murray Mfg. Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.

COATING MACHINERY
Dilts Machine Works
Frank W. Egan & Co.
Globe-Brower Company, Inc.
The Mayer Machine Co., Inc.
Moore & White Co.
Pusdevin Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G., & Co., Inc.

COATING MATERIALS
American Cyanamid Company Industrial Chemicals Division
The Dow Chemical Co.
E. I. Du Pont De Nemours & Co., Inc.
B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Hercules Powder Co.
J. M. Huber Corp.
Monsanto Chemical Company
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.
Pittston Division, Libbey-Owens-Ford Glass Co.
Reichhold Chemicals, Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

COGS
The N. P. Bowsher Co.

COMPLETE FOURDRINIER ROLL GRINDING
Manchester Machine Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
Nash Engineering Co.
Roots-Connersville Blower Corp

CONDENSATE FILTERS
Hungerford & Terry, Inc.
The Permutit Company

CONDENSERS
Fibre Making Processes, Inc.

CONSISTENCY REGULATORS
Askania Regulator Co.
Bird Machine Company
Dufferin Shower Company
Paper & Industrial Appliances

CONSTRUCTION CONTRACTORS
C. M. Gass & Sons

CONSULTING ENGINEERS
Black Clawson Company
Dilts Machine Works
Ebasco Services
Frank W. Egan & Co.
Alvin E. Johnson & Co., Inc.
Main, Inc., Chas. T.
The Rust Engrg. Co.
Shartle Bros. Mch. Co.
J. E. Sirrine & Co.
Frank C. Vaughan
John Waldron Corp.
H. G. Weber & Co., Inc.

CONTINUOUS DIGESTER
Paper & Industrial Appliances

CONTROLLERS
Black Clawson Company
The Brown Instrument Co.

CONTROLS
The Brown Instrument Co.
Johnson Corp.
Foxboro Control Co.
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

CONVERTING MACHINERY
The Bagley & Sewall Company
Egan, Frank W., & Co.
John Waldron Corp.
Dilts Machine Works

CONVEYORS
Black Clawson Company
Jeffrey Mfg. Co.
Murray, D. J., Mfg. Co.
Ross Engineering Corp., J. O.
Shartle Brothers Mch. Co.
Stephens-Adamson Mfg. Co.

CORES
Eltzroth Paper Co.
Smith & Winchester Mfg. Co.
Sonoco Products Co.

CORROSION RESISTANT
Amercoat Corporation

COTTON LINTER
Alpha Cellulose Corp.
Railway Supply & Mfg. Co.

COTTON PULP
Alpha Cellulose Corp.

COUCH ROLLS
Beloit Iron Works

COUPLINGS
The Bagley & Sewall Company
Black Clawson Company
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John

CRANES
Cleveland Crane & Engrg. Co
Whiting Corp.

CURL TESTER
Thwing-Albert Instrument Co

CUTTERS
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works
Globe-Brower Company, Inc
Graphic Arts International Corp.
Thomas W. Hall Co.
Harris-Seybold Co.
Jagenberg-Werke Akt. Ges.
Moore & White Co.
Perkins & Son, Inc., B. F.
Rice Barton Corporation
The Sandy Hill Iron & Brass
Taylor, Stiles & Co.
Works
The Smith & Winchester Mfg. Co.

CYLINDER MOULDS
Manchester Machine Co
Rice Barton Corporation

CYLINDERS
M. W. Jenkins Sons, Inc.

DAMPENERS
Perkins & Son, Inc., B. F.
Valley Iron Works Co.

DECKLE WEIRING
Williams-Gray Co.

DEFIBRATORS
American Defibrator Co.

DE-INKING
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General Dyestuff Corp.
Kinsley Chemical Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

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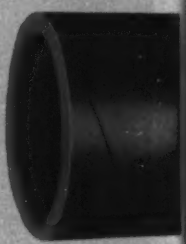

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Kindey Chemical Co.
Nopco Chemical Co.

De-MINERALIZING EQUIPMENT
Hungerford & Terry, Inc.
The Permutit Company

DEMULSIFIERS
Wyandotte Chemicals Corp., Michigan Alkali Div.

DENSOMETERS
Bunge Pulp & Paper Co.
W. & L. E. Gurley

DESIGN CONSTRUCTION
Ebasco Services

DETERGENTS
American Cyanamid Company Industrial Chemicals Division
Calgon, Inc.
Diamond Alkali Co.
General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

DEWAXING CHEMICALS
American Cyanamid Company Industrial Chemicals Division
General Dyestuff Corp.
Nopco Chemical Co.

DIFFERENTIAL SCALES
Thwing-Albert Instrument Co

DIGESTER CIRCULATING SYSTEMS
Fibre Making Processes, Inc.

DIGESTERS
Babcock & Wilcox Co.
Blow Knox Company
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.
Lakewood
Paper & Industrial Appliances
Pusey & Jones Corp.

DISPERSING AGENTS
Calgon, Inc.
Diamond Alkali Co.
General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

DOCTORS
The Bagley & Sewall Company
Bird Machine Company
Black Clawson Company
Downingtown Mfg. Co.
Lindell United Co.
Ludding Engineering Corp.
The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
The Bagley & Sewall Company
Bird Machine Company
Ludding Engrg. Corp.
The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co
Simonds Saw & Steel Co.

DRIERS
The Bagley & Sewall Company
Black Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc
Lokenweld
The Moore & White Co.
Murray Mfg. Co., D. J.
J. J. Ross Company
Red-Ray Mfg. Co., Inc.
Rice Barton Corporation
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co

DRILLED SUCTION COUCH ROLLS
Manchester Machine Co.

DRILLED SUCTION DRUM ROLLS
Manchester Machine Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
The Bagley & Sewall Company
Beloit Iron Works
Bird Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Farrel-Birmingham Co.
Jeffrey Mfg. Co.
General Electric Company
Gibbs-Brower Company, Inc.
Moore & White Co.
Murray, D. J., Mfg. Co.
Pusey & Jones Corp.
Rice Barton Corporation
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

DRUM WINDERS
Manchester Machine Co.
Rice Barton Corporation

DRYER DRAINAGE
Stickle Steam Specialties Co.

DRYER ROLL PYROMETER
Thwing-Albert Instrument Co.

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
M. W. Jenkins Sons, Inc.
E. D. Jones & Son Co.
Moore & White Co.
D. J. Murray Mfg. Co.
John Waldron Corp.

DUSTING BRUSHES
M. W. Jenkins Sons, Inc.

DYESTUFFS
American Cyanamid Company Calco Chemical Div.
Bunge Pulp & Paper Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.

ELECTRIC HYGROMETER
Thwing-Albert Instrument Co

EMBOSSING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
John Waldron Corp.

EMBOSSING ROLLS
The Appleton Machine Co
Gibbs-Brower Company, Inc.
Holyoke Machine Co.
Northern Engraving & Mch. Co
B. F. Perkins & Son, Inc.
John Waldron Corp.
Wheeler Roll Co.

EMULSIFIERS
General Dyestuff Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp.

ENZYMES
Rohm & Haas Co.
Vanderbilt Co., R. T.

EVAPORATORS
Davis Engrg. Corp.
Gaulin-Birmingham Mfg. Co. Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

EXPANDERS
Mount Hope Machinery Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O

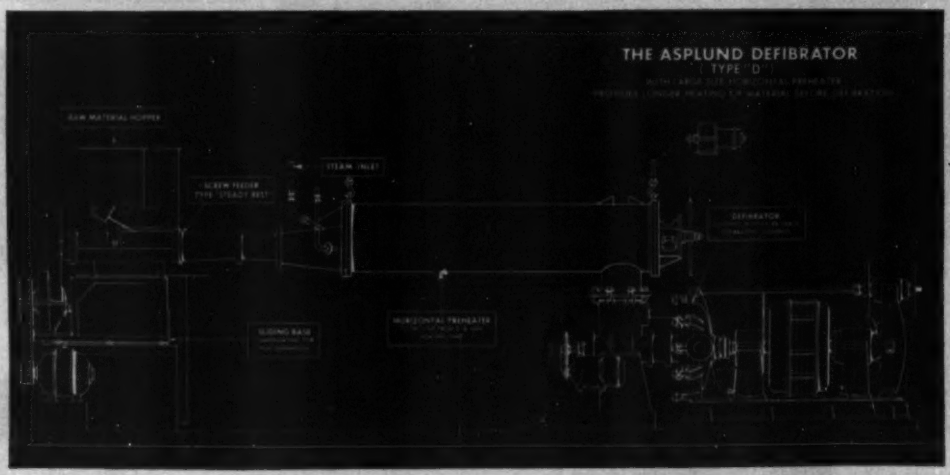
FEEDERS
Hoft Company, Inc.
Jeffrey Mfg. Co.
Merrick Scale Mfg. Co.
The Permutit Company
Stephens-Adamson Mfg. Co.

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Morey Paper Mill Supply Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.
Williams-Gray Co.

FELT CLEANERS
Calgon, Inc.
General Dyestuff Corp.
Nopco Chemical Co.

FELT CONDITIONERS
Bird Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works

FELT GUIDES
Black Clawson Company
Frank W. Egan & Co.
Gilbert & Nash Co.
Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co
Waldron Corp., John



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Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

FILTERS
Bird Machine Company
Holyoke Machine Co.
J. M. Huber Corp.
Hungerford & Terry, Inc.
Johnson Corp.
Moore & White Co.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Walworth Company

FITTINGS
The Bagley & Sewall Company
Crane Company
Shartle Bros. Mch. Co.
Walworth Company

FLEXIBLE COUPLINGS
Egan, Frank W., & Co.
Jeffrey Mfg. Co.
Lovejoy Flexible Coupling Co.
John Waldron Corp.

FLOORING, GRATING AND TREADS
The Goodyear Tire & Rubber Company
Norton Co.

FLOW BOXES, STAINLESS-CLAD
Lukens Steel Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works

FORK LIFT TRUCKS
Clark Equipment Company, Industrial Truck Division
Elwell Parker Elec. Co.
Towmotor Corp.

FORMATION TESTERS
Thwing-Albert Instrument Co.
Williams Apparatus Co., Inc.

FOURDRINIERS
Beloit Iron Works
Black Clawson Company
Downingtown Mfg. Co.
The Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co

FREENESS TESTERS
Testing Machines, Inc.
Williams Apparatus Co.

FURNACES
Hoft Company, Inc.

GASKETS
The Goodyear Tire & Rubber Company

GEARS
The Bagley & Sewall Company
Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Stroh Process Steel Co.
Valley Iron Works Co.
Westinghouse Electric Corp.
Western Gear Works

GRAPPLES
Blaw-Knox Company

GRAVITY FILTERS
Holyoke Machine Co.

GRINDERS
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell United Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
Norton Company
Simonds Abrasive Co.

GUIDES
The Bagley & Sewall Company
Egan, Frank W., & Co.
Gilbert & Nash Co.
The Moore & White Co.
Mount Hope Machinery Co.
Rice Barton Corporation
John Waldron Corp.

GUMMING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
The Sandy Hill Iron & Brass Works

GUMS
National Starch Products, Inc.
Stein-Hall Co., Inc.

HEAT EXCHANGERS AND RECOVERY SYSTEMS
Fibre Making Processes, Inc.
Stickle Steam Specialties Co.
Westinghouse Electric Corp.

HEATING, VENTILATING & AIR CONDITIONING
The Appleton Machine Co.
E. D. Jones & Sons Co.
General Electric Co.
D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Stickle Steam Specialties Co.
Valley Iron Works Co.

HOSE (Air, Water, Suction, etc.)
The Goodyear Tire & Rubber Company

HUMECTANTS
Aktivin Division, Hayden Chemical Corp.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

IMPREGNANTS
American Cyanamid Company, Industrial Chemicals Division
B. F. Goodrich Chemical Co.

INDENTING MACHINES
Dilts Machine Works

INDUSTRIAL TRACTORS
Clark Equipment Company, Industrial Truck Division
Towmotor Corp.

INKOMETER
Thwing-Albert Instrument Co.

INSTRUMENTS, TESTING AND MEASURING
Brown Instrument Co.
Bunge Pulp & Paper Co.
Cambridge Instrument Co.
General Electric Company
W. & L. E. Gurley
B. F. Perkins & Son
Photovolt Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Thwing-Albert Instrument Co
Williams Apparatus Co.

JOINTS
The Bagley & Sewall Company
Beloit Iron Works
Johnson Corp.
Lovejoy Flexible Coupling Co

Rice Barton Corporation
Shartle Bros. Mch. Co.
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KNOTTERS
Fibre Making Processes, Inc.

KRAFT WRAPPING PAPERS
Canadian Newsprint Supply Co.

LABORATORY CORRUGATOR
Thwing-Albert Instrument Co.

LABORATORY EQUIPMENT
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Bauer Brothers Co.
Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
Egan, Frank W., & Co.
E. D. Jones & Sons Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.
Williams Apparatus Co., Inc.

LAMINATING MACHINES
The Bagley & Sewall Company
Dilts Machine Works
Egan, Frank W., & Co.
Rice Barton Corporation
John Waldron Corp.

LAY BOYS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.

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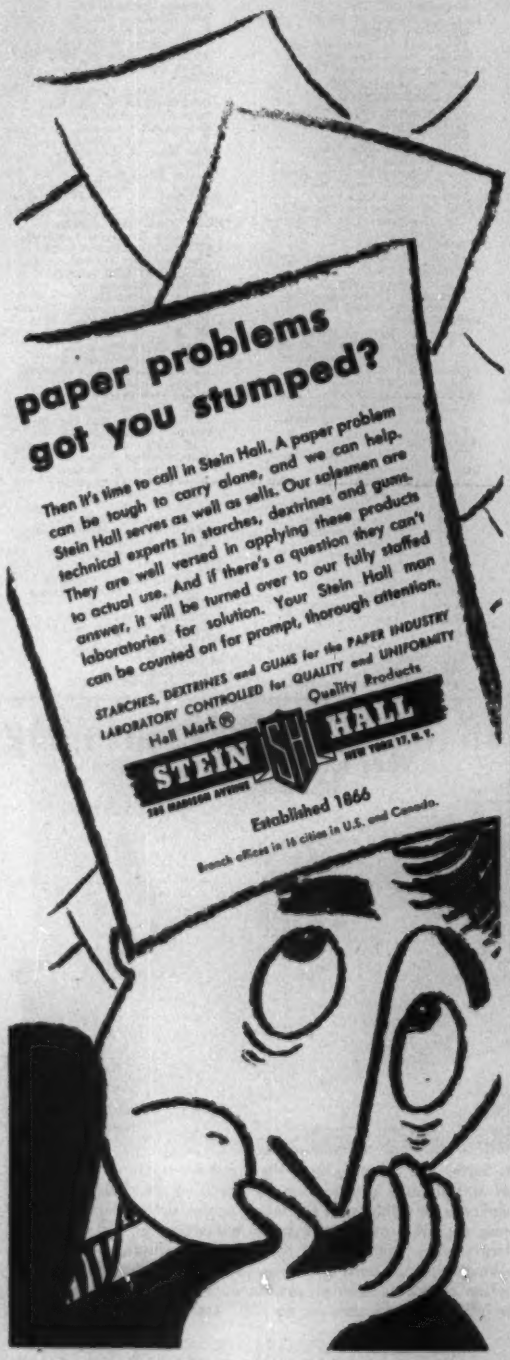
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Dilts Machine Works
Jeffrey Mfg. Co.
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
The Weltman Engrg. Co.

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Stroh Process Steel Co.

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Lobdell Co.
Stephens-Adamson Mfg. Co.
Testing Machines, Inc.

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Bunge Pulp & Paper Co.
Moore & Munger
Sun Oil Company

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Sickle Steam Specialties Co.
Williams Apparatus Co., Inc.

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Fairbanks, Morse & Co.
General Electric Company
Reliance Electric & Engrg. Co.

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Canadian Newsprint Supply Co.

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NOZZLES
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Industrial Truck Division
Johnson Corporation
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Shartle Brothers Machine Co.

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Clark Equipment Company
Industrial Truck Division

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Manchester Machine Co.
Rice Barton Corporation

PAPER MACHINES
The Bagley & Sewall Company
Beloit Iron Works
Bagley & Sewall Co.
Black Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lakeweld
Moore & White Co.
Posey & Jones Corp.
Rice Barton Corporation
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black Clawson Company
E. D. Jones & Sons Co.
The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Jagenberg-Werke Akt. Ges.
Lamston Co., Samuel M.

PARAFFINE WAXES
Moore & Munger
Sun Oil Company

PARAFFIN WAX EMULSIONS
Napco Chemical Co.

PASTING MACHINES
Beloit Iron Works
Black Clawson Company
Dilts Machine Wks.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Pusdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

PEBBLE MILLS
F. L. Smidth & Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.

pH METERS
Cambridge Instrument Co.
Tinius-Albert Instrument Co.

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Babcock & Wilcox Co.
Crane Company
Grinnell Company
Michigan Steel Casting Co.
National Tube Co.
Walworth Company

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Armco Drainage & Metal Products, Inc.
Crane Company
Grinnell Company
Michigan Steel Casting Co.
Walworth Co.

PITCH CONTROL
American Cyanamid Company
Industrial Chemicals Division
General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.

PLASTICIZERS
American Cyanamid Company
Industrial Chemicals Division
Aktivin Division, Heyden Chemical Corp.
B. F. Goodrich Chemical Co.
Naugatuck Chemical
Division of U. S. Rubber Co.
Nopco Chemical Co.

PLATERS
Gibbs-Brower Company, Inc.
Perkins & Son, Inc., H. F.

PLATES
Armco Steel Corp.
Babcock & Wilcox Co.
J. O. Ross Engrg. Corp.
Lukenweld Division
Lukens Steel Company
Timken Roller Bearing Co.

PLUGS
The Appleton Machine Co.
Black Clawson Company
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

POPE TYPE REELS
Egan, Frank W., & Co.
Manchester Machine Co.
Rice Barton Corporation

PRECISION SAMPLE CUTTER
Testing Machines, Inc.
Tinius-Albert Instrument Co.

PRESERVATIVES
E. I. du Pont de Nemours & Co.
General Dyestuff Corp.

PRESS ROLLS
Beloit Iron Works
Rice Barton Corporation

PRESSURE FILTERS
Holyoke Machine Co.

PRESSURE VESSELS
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.

PRESSES
Black Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
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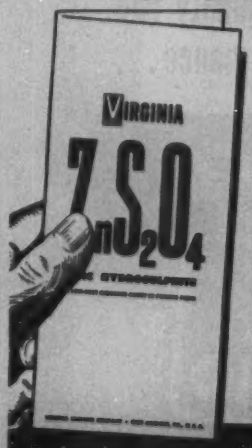

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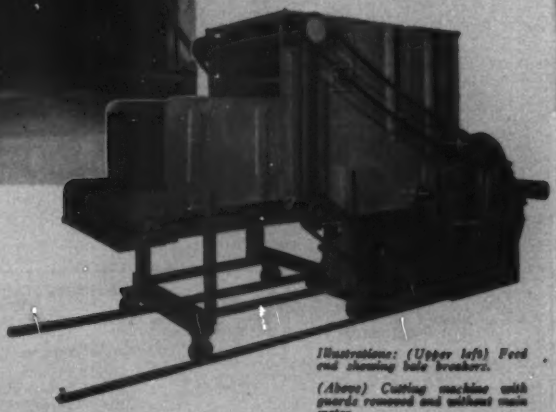

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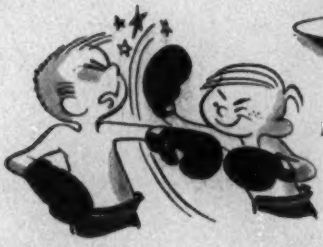

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